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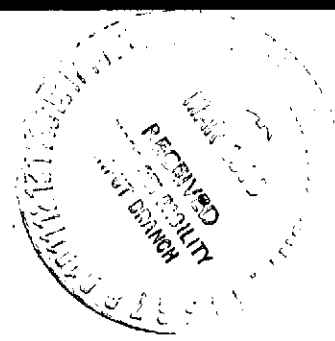

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 136)

JANUARY 1975

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NASA SP-7011(136)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 136)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1974 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 238 reports, articles and other documents announced during December 1974 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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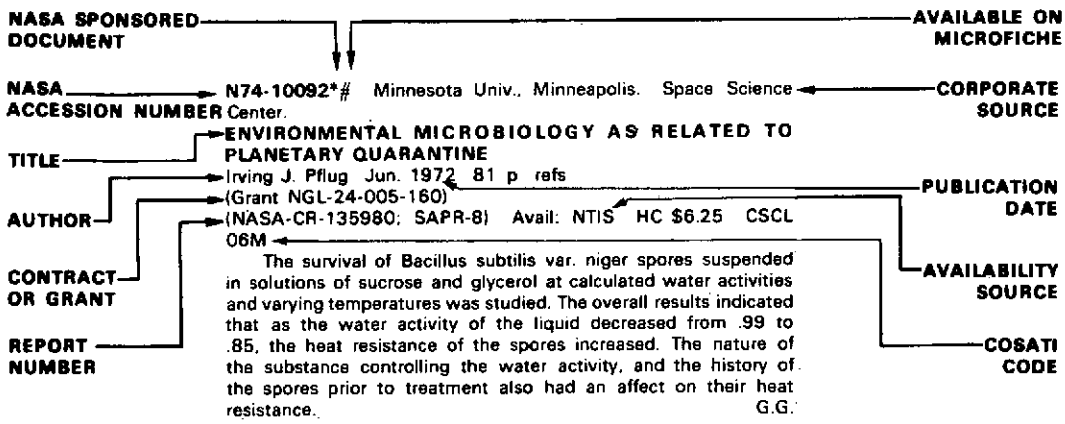

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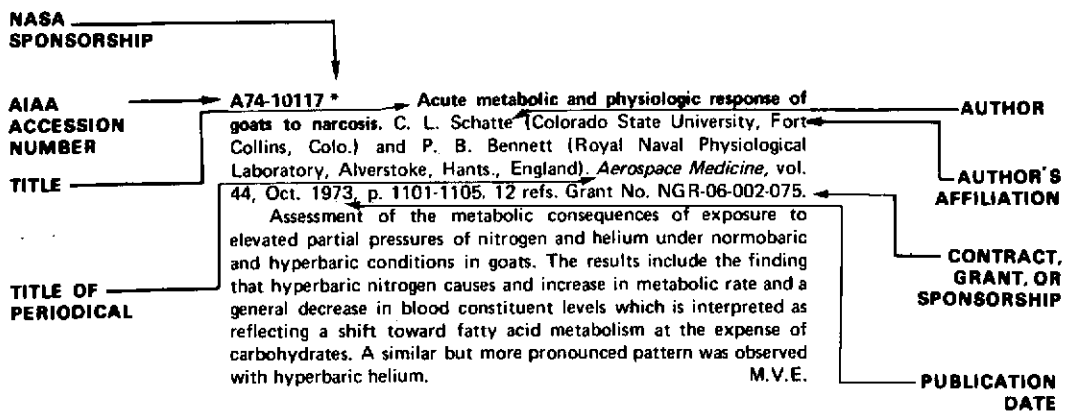

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl.136) **JANUARY 1975**

IAA ENTRIES

A74-44345 # **The morphofunctional organization of vascular tonus control at the spinal level (Morfofunktsional'naia organizatsiia reguliatsii sosudistogo tonusa na spinal'nom urovne).** A. V. Val'dman and V. A. Tsyrlin (I Meditsinskii Institut, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 5, July-Sept. 1974, p. 3-28. 136 refs. In Russian.

The role of spinal sympathetic structures in the maintenance of neuronal tonus of vessels in the circuit of vascular reflexes connected with the activation of afferent fibers of various modality is evaluated on the basis of data obtained from the literature and the authors' own work. The presence of an inherent inhibitory apparatus of the spinal cord is postulated, which takes part in the maintenance of vascular tonus at the segmental level. Descending relieving and inhibitory pathways of suprasegmental origin are investigated, and their neurochemical organization is analyzed. P.T.H.

A74-44346 # **Self-organization of the sensorimotor functional system under conditions of delayed feedback /visual afferentation/ from results of activity (Samoorganizatsiia sensomotornoi funktsional'noi sistemy v usloviiakh zaderzhki obratnoi sviazi /vizual'noi afferentatsii/ ot rezul'tatov deiatel'nosti).** A. M. Zingerman, D. N. Menitskii, and L. S. Khachatur'iants (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 5, July-Sept. 1974, p. 59-81. 88 refs. In Russian.

A74-44445 # **Organization of the tracing movements in the human visual system (Ob organizatsii dvizhenii proslezhivaniia v zritel'noi sisteme cheloveka).** B. A. Karpov (Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) and A. N. Karpova (III Psikhiatricheskaia Bol'nitsa, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Aug. 1974, p. 1150-1158. 21 refs. In Russian.

The eye movements of healthy individuals engaged in tracing the pendulum-like motions of an object on a screen and their ability to extrapolate upon sudden disappearance of the object were tested. It is found that different components of the tracing motions follow different laws of extinction. Subsequent testing of subjects with damage to the occipital lobes indicates that the occipital cortex is instrumental in generating the complex tracing programs of the secondary regulatory systems. J.K.K.

A74-44446 # **pO2 distribution in neurons and cerebral capillaries as a function of the rate of blood flow under normal conditions and in hypoxemia (Raspredelenie pO2 v neironakh i kapilliarakh mozga v zavisimosti ot skorosti krovotoka v norme i pri gipoksemii).** Iu. Ia. Kisliakov (Akademiia Nauk SSSR, Institut Fiziologii i Biokhimii, Leningrad, USSR) and K. P. Ivanov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Aug. 1974, p. 1216-1222. 13 refs. In Russian.

A74-44447 # **Hemodynamic reactions and oxygen metabolism indicators in resting skeletal muscle during arterial hypoxemia (Gemodinamicheskie reaktsii i pokazateli kislorodnogo balansa v pokoiashcheisia skeletnoi myshtse pri arterial'noi gipoksemii).** N. Ia. Shustova and V. A. Levtov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Aug. 1974, p. 1223-1234. 22 refs. In Russian.

A74-44448 # **Dynamics of the respiratory parameters of the arterial blood, spinal fluid, and the tissue of the bulbar respiratory center during hypercapnia, hypocapnia, and hyperoxia (Dinamika dykhatel'nykh pokazatelei arterial'noi krovi, likvora i tkani oblasti bul'barnogo dykhatel'nogo tsentra pri giperkapnii, gipokapnii, giperoksii).** E. A. Iumatov (Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Aug. 1974, p. 1241-1248. 30 refs. In Russian.

A74-44449 # **Some peculiarities of the thermoregulatory processes in animals in a helium-oxygen environment (Nekotorye osobennosti termoreguliatsii zhivotnykh v gelio-kislorodnoi srede).** V. A. Konstantinov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Aug. 1974, p. 1272-1277. 14 refs. In Russian.

Laboratory rabbits were made to breathe a helium-oxygen mixture instead of air at various ambient temperatures. This resulted in an increase in thermoregulatory muscular activity and a lowered resistance to chills, as evidenced by the fact that the onset of shivering occurred earlier and at a higher outside temperature during helium inhalation. This is attributed to the cooling effect of helium in the thermoreceptors of the upper respiratory pathways. J.K.K.

A74-44458 # **Elimination of cold-induced nonshivering thermogenesis by hypercapnia.** W. E. Pepelko and G. A. Dixon (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *American Journal of Physiology*, vol. 277, Aug. 1974, p. 264-267. 21 refs.

Investigation of the effect of hypercapnia on blocking the increase in cold-induced nonshivering thermogenesis (NST) in cold-adapted rats using total body oxygen uptake as an indirect estimate of heat production. Cold exposure resulted in a 50-60% increase in oxygen uptake. Additions of 5%, 10%, or 20% of carbon dioxide to the breathing gas resulted in a progressive decrease in oxygen uptake at both 0 and 24 deg C. NST can be completely eliminated by adding 10% or more carbon dioxide to a breathing mixture. M.V.E.

A74-44459 **Effects of exercise on the ultrastructure of skeletal muscle.** W. D. Bowers, Jr., R. W. Hubbard, J. A. Smoake, R. C. Daum, and E. Nilson (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *American Journal of Physiology*, vol. 227, Aug. 1974, p. 313-316. 5 refs.

It has been reported that disruption of muscle cell mitochondria results from exhaustive exercise. Conflicting data suggest that no

ultrastructural changes occur under these circumstances. Electron-microscopic evidence is presented in this report which demonstrates an increased sensitivity of membranous organelles in exhausted rat skeletal muscle to certain fixation procedures. Although this reflects an uncharacterized difference between rested and exhausted skeletal muscle, the results of this study also support the concept that no drastic structural degeneration occurs during exhaustive exercise and tends to resolve the source of conflicting ultrastructural data.
(Author)

A74-44460 **Magnesium effects on ionic exchange and mechanical function in rat ventricle.** K. I. Shine and A. M. Douglas (California, University, Los Angeles, Calif.). *American Journal of Physiology*, vol. 227, Aug. 1974, p. 317-324. 21 refs. Grants No. PHS-HE-05909-01; No. PHS-11074-05.

A74-44461 **Sarcomere length-active force relations in living mammalian cardiac muscle.** G. H. Pollack and L. L. Huntsman (Washington, University, Seattle, Wash.). *American Journal of Physiology*, vol. 227, Aug. 1974, p. 383-389. 17 refs. Grants No. PHS-HE-13517; No. PHS-GM-15991; No. NIH-GM-16436.

Investigation of the sarcomere length in 'living' cardiac muscle at which maximum force is generated. Transmitted light microscopy was used with preparations thin enough to permit observation of sarcomeres in the living state, thereby avoiding potential artifacts accompanying preparations of fixed and sectioned specimens. The physiologic range of sarcomere lengths was found to vary from muscle to muscle. The implications of this and other findings are discussed. M.V.E.

A74-44462 **L-tryptophan - Effects on body temperature in rats.** R. P. Francesconi and M. Mager (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *American Journal of Physiology*, vol. 277, Aug. 1974, p. 402-405. 36 refs.

Investigation of the effect of parenteral administration of tryptophan on the thermoregulatory responses in rats maintained at 4, 10, 17, and 31 deg C. At 4 C, significant dose-dependent reduction in body temperature occurred. At intermediate ambient temperatures, the hypothermia was attenuated, and no significant effects were noted at 31 C. Tryptophan seems to be acting indirectly via serotonin production. M.V.E.

A74-44463 **Effects of isoproterenol on contractile function of the ischemic and anoxic heart.** S. Davidson, P. R. Maroko, and E. Braunwald (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.). *American Journal of Physiology*, vol. 227, Aug. 1974, p. 439-443. 22 refs. Research supported by the John A. Hartford Foundation; Grant No. NIH-72-2949.

A74-44464 **Regional vagosympathetic control of the heart.** W. C. Randall and J. A. Armour (Loyola University, Maywood, Ill.). *American Journal of Physiology*, vol. 227, Aug. 1974, p. 444-452. 20 refs. Grant No. NIH-HL-08682.

Investigation of the levels of entry and exit of afferent and efferent nerves in the vagosympathetic region, and study of their combined roles in the reflex regulation of the cardiac function. Vagosympathetic trunk stimulation was used at each of six anatomical regions from the midcervical level to that of the superior pulmonary veins in anesthetized dogs. The nature and implications of the elicited responses are discussed. M.V.E.

A74-44610 **A comparison of the relative value of non-invasive techniques - echocardiography, systolic time intervals, and apexcardiography - in the diagnosis of primary myocardial disease. I.** G. McDonald and E. R. Hobson (St. Vincent's Hospital, Melbourne, Australia). *American Heart Journal*, vol. 88, Oct. 1974, p. 454-462. 21 refs.

A74-44611 **Electrophysiology and pharmacology of cardiac arrhythmias. II - Relationship of normal and abnormal electrical activity of cardiac fibers to the genesis of arrhythmias. A - Automaticity.** A. L. Wit, M. R. Rosen (Columbia University, New York, N.Y.), and B. F. Hoffman. *American Heart Journal*, vol. 88, Oct. 1974, p. 515-524. 38 refs. Grant No. PHS-HL-12738-05.

A74-44618 **Effect of cardiac output on the in vivo CO2 titration curve during acute breathing of CO2 in the dog.** N. Takano and E. Nakano (Kanazawa University, Kanazawa, Japan). *Respiration Physiology*, vol. 21, Aug. 1974, p. 139-155. 33 refs.

A74-44619 **Control of respiration in exercising dog Interaction of chemical and physical humoral stimuli.** R. Flandrois, J. R. Lacour, and J. P. Eclache (Université Claude Bernard, Lyon; Saint-Etienne, Université, Saint-Etienne, France). *Respiration Physiology*, vol. 21, Aug. 1974, p. 169-181. 17 refs.

A74-44620 **Human core temperature increase as a stimulus to breathing during moderate exercise.** J. G. Henry and C. R. Bainton (California, University, San Francisco, Calif.). *Respiration Physiology*, vol. 21, Aug. 1974, p. 183-191. 15 refs. Grants No. PHS-GM-05881; No. PHS-GM-00063.

A74-44621 **Increased lung recoil during acute hypoxia in dogs.** D. J. Strieder, R. Laguarda, L. C. Stigol, and M. E. Wohl (Children's Hospital Medical Center, Harvard University, Boston, Mass.). *Respiration Physiology*, vol. 21, Aug. 1974, p. 193-201. 21 refs. Grants No. PHS-HL-13829; No. PHS-HL-10436.

Investigation of the effect of hypoxia on lung mechanics by monitoring transpulmonary pressure before and during short periods of hypoxia in anesthetized dogs. Beside the expected increase in airway resistance, hypoxia resulted in increased lung recoil and decreased lung volume. Compliance decreased slightly but not significantly. M.V.E.

A74-44622 **Effects of hypoxia, hypercapnia and changes in body temperature on the pattern of breathing in cats.** J. G. Widdicombe and A. Winning (Oxford University, Oxford, England). *Respiration Physiology*, vol. 21, Aug. 1974, p. 203-221. 25 refs.

A74-44629 # **Change in some indices of protein metabolism in the dynamics of the development of EAE during various manipulations of the hypothalamus (Izmenenie nekotorykh pokazatelei belkovogo obmena v dinamike razvitiia EAE pri razlichnykh vozdeistviiakh na gipotalamus).** G. V. Abramchik (Akademiia Nauk Belorusskoi SSR, Institut Fiziologii, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady*, vol. 18, July 1974, p. 656-658. 14 refs. In Russian.

A74-44683 **A mathematical model for the ultrasonic measurement of respiratory flow.** W. Blumenfeld, P. D. Wilson, and S. Turney (Maryland, University, Hospital, Baltimore, Md.). *Medical and Biological Engineering*, vol. 12, Sept. 1974, p. 621-625. 10 refs.

A mathematical model is developed for the measurement of respiratory air flow, based on the phase shift of ultrasonic pulse trains. A correction is made for the velocity of sound as a function of gas composition, moisture, temperature and pressure. Error estimates and calibration procedures as they relate to clinical application are discussed. (Author)

A74-44684 **On modelling the function of sympathetic ventricular augmentor fibers.** M. E. Greene and J. W. Clark (Rice University, Houston, Tex.). *Medical and Biological Engineering*, vol. 12, Sept. 1974, p. 664-674. 20 refs. Grant No. PHS-HE-09521.

A functional model is proposed for studying the dynamics of transmitter release at the neuromuscular junction in cardiac tissue and the subsequent changes brought about in left ventricular elastance (i.e., the instantaneous ratio of ventricular pressure to ventricular volume). This model of ventricular mechanics reflects changes in inotropic state, end-diastolic volume (preload) and time. M.V.E.

A74-44685 **An ergometer bicycle controlled by heart rate.** S. Jacobsen and O. Johansen (Odense Universitet, Odense, Denmark). *Medical and Biological Engineering,* vol. 12, Sept. 1974, p. 675-680.

Bicycling, which involves large groups of muscles at work, is a good way of measuring work capacity. Normally in ergometer tests the load is set and the subject's heart rate (HR) is brought into a steady-state value, which might be dangerous for the person. To simplify and unify the test procedure and, in addition, decrease the risk of overloading the subject, a heart-rate-controlled ergometer was constructed. Besides the necessary feedback system, the ergometer is equipped with an automatic readout of the test result. (Author)

A74-44732 **Isolation of photoreceptor and conventional nerve terminals by subcellular fractionation of rabbit retina.** M. J. Neal and C. K. Atterwill (London, University, London, England). *Nature,* vol. 251, Sept. 27, 1974, p. 331-333. 25 refs. Research supported by the SKF Foundation and University of London.

A74-44799 # **Middle ear muscle effects on cochlear responses to bone-conducted sound.** D. R. F. Irvine and K. G. Wester (California, University, Irvine, Calif.). *Acta Physiologica Scandinavica,* vol. 91, Aug. 1974, p. 482-496. 47 refs. Research supported by the Fund for Research in Psychiatry; Grants No. NIH-NS-07661; No. PHS-MA-19314.

A74-44800 # **Maximal work performance at raised air and helium-oxygen pressures.** L. Fagraeus (Kungl. Karolinska Institutet, Stockholm, Sweden). *Acta Physiologica Scandinavica,* vol. 91, Aug. 1974, p. 545-556. 34 refs. Research supported by the Swedish Medical Research Council. SMRC Project 40X-682.

Study of cardiorespiratory and metabolic responses to maximal exercise within a wide range of ambient air pressures (1-6 ATA). Data during air breathing at 3 ATA were compared with those obtained during inhalation of a mixture of oxygen and helium at the same ambient pressure in order to study the effects of changes in inspired gas density on maximal performance at a given raised ambient pressure and inspired oxygen pressure. It was found that the beneficial effect of hyperoxia on maximal oxygen uptake and endurance time at normal gas density is nullified when gas density is high enough to cause ventilatory impairment with concomitant CO2 retention. P.T.H.

A74-44823 # **Investigation of characteristics of the eye-pursuit-movement system by means of apparent motions (Untersuchung von Eigenschaften des Augenfolgesystems mit Hilfe von Scheinbewegungen).** A. Korn (Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung, Institut für Informationsverarbeitung in Technik und Biologie, Karlsruhe, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie,* vol. 21, no. 3, 1974, p. 378-393. 15 refs. In German. Research supported by the Bundesministerium für Forschung und Technologie.

An excitation of various locations on the retina by means of successively presented optical stimuli produces under certain conditions in the subject the impression of a motion of the first stimulus to the location of the second stimulus. This phenomenon is used in a quantitative study concerning the activation of slow eye pursuit movements by successive stimuli. The occurrence or absence of apparent motion provides a simple initial criterion in an evaluation of the significance of stimulus parameters for a slow pursuit motion. A variation of stimulus parameters is discussed, giving attention to the stroboscope frequency, the apparent motion in the case of different patterns, and velocity tolerances in the case of the apparent motion. G.R.

A74-44868 **The determination of functional arm reach boundaries for operation of manual controls.** M. I. Bullock (Queensland, University, Brisbane, Australia). *Ergonomics,* vol. 17, May 1974, p. 375-388. 23 refs. Research supported by the Department of Civil Aviation of Australia.

A description is given of a method which was developed to make functional arm reach measurements involving a representative sample of Australian light-aircraft pilots, firmly restrained by a diagonal lap and sash harness. The structural anthropometric dimensions of the subjects are discussed along with the functional anthropometric measurements. Attention is given to a review of previous experiments, the apparatus used in the investigation, and the experimental procedure. G.R.

A74-44869 **Temporal discrepancies in the electromyographic study of rapid movement.** T. Corser (St. Johns's College, York, England). *Ergonomics,* vol. 17, May 1974, p. 389-400. 9 refs.

Floating bipolar surface electrodes were used to record EMGs of the elbow flexors and extensors during rapid flexions and extensions. The results of the investigation are discussed, taking into account relaxation delays, the effects of relaxation delays on contraction delays, the effect of load on relaxation delays, and continuous rapid alternate flexions and extensions of the elbow. The results support the assumption that timing of muscular contractions is a critical factor and that even discrepancies of less than 100 msec could lead to serious misinterpretations of their EMG recordings. G.R.

A74-44909 **Visual sensitivity at an edge.** K. N. Wildman (Florida State University, Tallahassee, Fla.). *Vision Research,* vol. 14, Sept. 1974, p. 749-755. 16 refs. Grant No. NIH-EY-00358.

The threshold for a small spot of light rises as it approaches the edge of an illuminated area and gradually falls in the dark. The threshold rise on the illuminated side of the edge was found to be dependent on the intensity of the illuminated field, absent at low intensity. Short duration flashes of both edge and test spot abolished the threshold elevation on the illuminated side of the edge regardless of field intensity. While the threshold rise may be associated with lateral inhibitory effects, the fall in the dark was shown to be due to stray light in the eye. (Author)

A74-44910 **Acuity for length comparison in continuous and broken lines.** D. P. Andrews, J. M. Webb, and D. T. Miller (Keele, University, Keele, Staffs., England). *Vision Research,* vol. 14, Sept. 1974, p. 757-766. 14 refs. Research supported by the Medical Research Council.

An acuity-for-length comparison was made in figures made of spots and of lines. Performance was always better for the line figures, regardless of configuration, size, or orientation. Large constant errors were found which differed between spot and line figures (among other variables). Efficiency of use of positional information was low compared with an ideal observer. Results indicate that the high-grade positional data which Hubel units integrate to encode orientation or shape is not available for distance estimation. It is suggested instead that the positional specificity of Hubel units serves to encode distances, and that the positional specificity is low. (Author)

A74-44911 **The Stiles-Crawford effect - Two models evaluated.** R. Sansbury, J. Zacks, and J. Nachmias (Pennsylvania, University, Philadelphia, Pa.). *Vision Research,* vol. 14, Sept. 1974, p. 803-812. 20 refs. NSF Grants No. GB-16051-01; No. GB-24100X1.

Models explaining the Stiles-Crawford effect typically characterize individual receptors as either narrowly or broadly 'tuned' (i.e., reactive to light incident through a narrow or broad angle, respectively). Makous (1968) has shown that the retina contains narrowly tuned channels, but his data do not require channels that are tuned differently to reside in different cones. In the present study the evidence for narrowly tuned channels is bolstered by performing a replication of the Makous experiment using narrow-band stimuli, it is shown that increment threshold limiting factors operate only after the separate channel outputs have been combined, and on the basis of data from a brightness-matching experiment it is argued that channel input-output functions and channel output combinations are linear. If cone input-output functions are suf-

ficiently nonlinear, the demonstrated linear combination of channel outputs suggests that narrowly tuned channels coexist within broadly tuned cones. (Author)

A74-44912 Pupillometric measurement of difference spectra for three color receptors in an adult and a four-year-old. M. S. Banks and H. Munsinger (California, University, La Jolla, Calif.). *Vision Research*, vol. 14, Sept. 1974, p. 813-817. 23 refs. Research supported by the University of California; Grant No. NIH-04799.

Pupillometry was used as a measure of visual sensitivity in an adult and a four-year-old. Photopic spectral sensitivity determined with this measure agrees with the CIE photopic visibility curve, although the four-year-old's data show a small long-wavelength decrement. Difference spectra for three color receptors were also measured. Three distinct functions, similar to those obtained in adults by more traditional methods, were obtained in both subjects. (Author)

A74-44913 A spectral compensation method for determining the flicker characteristics of the human colour mechanisms. O. Estevez and H. Spekreijse (Amsterdam, Universiteit, Amsterdam, Netherlands). *Vision Research*, vol. 14, Sept. 1974, p. 823-830. 14 refs. Research supported by the Dutch Health Organization TNO.

The modulation depth of a light of intensity I sub 1, at wavelength lambda sub 1, and that of a light of intensity I sub 2 at wavelength lambda sub 2 can be so chosen that a patch of light containing these two modulated monochromatic beams is 'seen' as a steady field by one class of cones. This condition is reached if for one class of cones the increase in effective quantum catch due to an increase in I sub 1, is compensated by an identical decrease in I sub 2, and vice versa. Implicitly this stimulus is perceived as a modulated beam by another class of cones. The silencing of either of the two classes of cones in the red-green spectral range by this spectral compensation method resulted in similar flicker fusion curves for both the 'red' and 'green' cones, granted identity in respective states of adaptation. Results are obtained which show that the isolated human medium- and long-wavelength cone systems do not exhibit low-frequency attenuation even at retinal illuminations as high as 1250 td. (Author)

A74-44914 Dynamic properties of vision. IV - Thresholds of decremental flashes, incremental flashes and doublets in relation to flicker fusion. V - Perception lag and reaction time in relation to flicker and flash thresholds. VI - Stochastic threshold fluctuations and their effect on flash-to-flicker sensitivity ratio. J. A. J. Roufs (Instituut voor Perceptie Onderzoek, Eindhoven, Netherlands). *Vision Research*, vol. 14, Sept. 1974, p. 831-851, 853-869, 871-888. 122 refs.

A74-44915 Mode interference patterns in retinal receptor outer segments. W. Wijngaard (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). *Vision Research*, vol. 14, Sept. 1974, p. 889-893. 7 refs. Research supported by the Nederlandse Organisatie voor Zuiverwetenschappelijk Onderzoek.

Some calculated interference patterns of electromagnetic modes are presented for a dielectric waveguide representative for retinal receptor outer segments. The calculation results are shown to be in qualitative agreement with some of Enoch's (1963) observations. M.V.E.

A74-44916 Concerning the law of visual light sensation. V. F. Nesteruk and N. N. Porfireva (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Vision Research*, vol. 14, Sept. 1974, p. 899-902. 11 refs.

A law of visual perception which states that the sensation signal level with respect to a given adaptation level is proportional to the generalized contrast of appropriate external stimuli is examined and interpreted. After the law is recast in a different form and checked against a larger body of data, it is suggested that it owes its validity to the fact that the eye functions as a signal detector which is invariant with respect to the power of interference and processes information with a high degree of redundancy. J.K.K.

A74-44917 The contrast sensitivity of the peripheral visual field to drifting sinusoidal gratings. C. R. Sharpe. *Vision Research*, vol. 14, Sept. 1974, p. 905, 906. 5 refs.

To study the differences between contrast sensitivity in the central part of the visual field and that on the periphery, the contrast sensitivity for drifting sinusoidal gratings viewed with the peripheral visual field was determined as a function of temporal frequency of drift. It is found that in contrast to the central part of the field, different spatial frequencies have different temporal frequencies for maximum contrast sensitivity, with the lower spatial frequencies corresponding to higher optimum temporal frequencies. J.K.K.

A74-44919 Effects of ionizing radiation on tyrosine. H. C. Box, E. E. Budzinski, and H. G. Freund (Roswell Park Memorial Institute, Buffalo, N.Y.). *Journal of Chemical Physics*, vol. 61, Sept. 15, 1974, p. 2222-2226. 15 refs. Contract No. AT(11-1)-3212; Grant No. NIH-RL-00009.

From electron spin resonance and electron-nuclear double resonance measurements on single crystals of tyrosine hydrochloride subjected to X radiation at 4.2 K, two primary products were identified which are the result of an oxidation of the phenol ring of tyrosine. Only one reduction product was observed. The radiation products reported, formed at 4.2 K, are precursors of the products identified at higher temperatures since the electron spin resonance spectra obtained eventually, after warming to room temperature, appear to be the same as the spectra obtained by irradiation at room temperature. G.R.

A74-45027 Improved restraint for U.S. Army aircrewmen. R. W. Carr (Ultrasystems, Inc., Irvine, Calif.) and W. J. Nolan (U.S. Army, Air Mobility Research and Development Laboratory, Fort Eustis, Va.). In: International Conference on Occupant Protection, 3rd, Troy, Mich., July 10-12, 1974, Proceedings. Conference sponsored by the Society of Automotive Engineers. New York, Society of Automotive Engineers, Inc., 1974, p. 298-313.

The present work describes a developmental program for the design, optimization, and testing of an aircrew restraint system for a forward-facing, nonejecting crew seat, and for the preparation of a military specification that would define such a restraint system. An analytical investigation was performed to determine restraint system performance as a function of critical parameters, and a trade-off study of restraint system concepts was used to establish the optimum configuration of the aircrew restraint system to be defined by the proposed specification. Prototype restraint systems were then designed, fabricated, and tested, after which a draft specification was prepared. This specification was reexamined in order to obtain additional restraint systems that were statically and dynamically tested. Results of this effort demonstrated that the requirements of the draft specification were economically feasible and provided empirical data for the overall evaluation of the improved aircrew restraint system. P.T.H.

A74-45029 Effects of noise on people. J. D. Miller (Central Institute for the Deaf, St. Louis, Mo.). *Acoustical Society of America, Journal*, vol. 56, Sept. 1974, p. 729-764. 120 refs.

An overview of the effects of noise on people as can be determined from the scientific literature is presented. Only audible noise is considered and no attempt is made to describe the extent of the noise problem in terms of the number of people affected or in terms of social and economic costs. Rather, emphasis is placed on describing and classifying the adverse effects and relating them in a general way to the intensive and temporal properties of audible noise. For simplicity, the intensive dimension of the noise is usually given as the A-weighted sound level and detailed descriptions and evaluations of various acoustical measurements are for the most part

avoided. The effects of noise are classified as auditory, general psychological, and sociological, or as general physiological. A summary is included. (Author)

A74-45033 Comparison of ideal performance of some real-time acoustic imaging systems. K. Y. Wang (Houston, University, Houston, Tex.) and G. Wade (California, University, Santa Barbara, Calif.). *Acoustical Society of America, Journal*, vol. 56, Sept. 1974, p. 922-928. 19 refs.

The sensitivity of the static-ripple-diffraction, dynamic-ripple-diffraction, and Bragg-diffraction approaches to real-time acoustic imaging is evaluated, using threshold acoustic contrast as the criterion, and then compared with another class of systems that use fundamental scanning modes. Idealized models are used throughout, and among the fundamental scanning systems a nonexisting hypothetical model is selected as the reference. It is found that the inherent capabilities of the above-mentioned three systems are about the same, but the hypothetical system is better. Many important practical effects were ignored in the calculations, and only the most basic noise sources, which could not be eliminated even in principle, were included. Nonetheless, it is still clear on the real level that the fundamental scanning systems have the advantage in ultimate sensitivity. J.K.K.

A74-45034 Are two ears necessary for localization of sound sources on the median plane. J. Hebrank and D. Wright (Duke University, Durham, N.C.). *Acoustical Society of America, Journal*, vol. 56, Sept. 1974, p. 935-938. 9 refs.

Several investigators have shown that monaural localization of sound sources on the median plane (MP) is inferior to binaural MP localization, causing speculation that two ears are necessary for MP localization, and further, that two ears may allow binaural processing of asymmetrical pinna filtering making localization of unfamiliar sounds possible. The purpose of the two experiments reported in this paper is (1) to test the hypothesis that binaural subjects can localize unfamiliar sounds more accurately than monaural subjects, and (2) to evaluate monaural localization accuracy after training. The results show that binaural and monaural subjects have similar difficulty in localizing unfamiliar sounds and show that monaural subjects can easily be trained to localize as well as they normally localize with two ears. The results indicate MP localization is fundamentally a monaural process. (Author)

A74-45035 On perceptual integration of dichotically alternated pulse trains. A. W. F. Huggins (MIT, Cambridge, Mass.). *Acoustical Society of America, Journal*, vol. 56, Sept. 1974, p. 939-943. 16 refs. Grant No. NIH-NS-04332.

Subjects adjusted the rate of a binaural pulse train so that it matched the perceived rate of a dichotically alternated pulse train, in which successive pulses were heard in the left and right ears alternately. At low rates, subjects matched the total rate of pulses-into-the-head. At high rates, they matched the rate of pulses in one of their ears. The crossover was quite sharp, and took place when the interpulse interval in one ear was about 100 to 200 msec. The results are discussed in relation to results with alternated and temporally segmented speech, and to acoustic short-term memory. (Author)

A74-45036 On the differences between localization and lateralization. G. Plenge (Heinrich-Hertz Institut, Berlin, West Germany). *Acoustical Society of America, Journal*, vol. 56, Sept. 1974, p. 944-951. 21 refs.

The distinction between the outside-head perception of a sound source (localization) and the inside-head perception of a source (lateralization) is investigated. Although lateralization is usually associated with hearing through earphones and localization with the perception of an external source, experiments with earphones and simulated external sounds indicate that no such connection exists; the ear will always localize any sound that sufficiently resembles that of an external source, even when it is transmitted by earphones. J.K.K.

A74-45037 Pinna reflections as cues for localization. D. Wright, J. H. Hebrank, and B. Wilson (Duke University, Durham, N.C.). *Acoustical Society of America, Journal*, vol. 56, Sept. 1974, p. 957-962. 17 refs.

For monaural localization, the time delay between direct and pinna-reflected sound is the dominant feature of sound entering the external ear canal. Experiments measuring the human threshold of delay-time detection and the just noticeable difference of delay time were conducted employing white noise summed with a delay of itself. Threshold results show that delay times of 20 microsec are easily recognizable when the amplitude ratio of the delayed signal to the leading signal is greater than 0.67. Just noticeable difference results agree with measurements of the minimum audible angle for monaural localization. Results further demonstrate correspondence between human detection of a delay-summing process and an equivalent spectral filter. (Author)

A74-45168 # Reliability of human control. R. A. Albanese (USAF, School of Aerospace Medicine, Brooks AFB, Ohio). In: Reliability and biometry: Statistical analysis of lifelength; Proceedings of the Conference, Tallahassee, Fla., July 9-27, 1973. Philadelphia, Pa., Society for Industrial and Applied Mathematics, 1974, p. 727-742. 17 refs.

A method is presented to estimate the reliability of human control of moving vehicles, or other machines. The theory of stochastic processes and linear systems is used, and the reliability problem is treated as a 'crossing' problem. Pertinent aspects of stochastic processes and linear systems theory are reviewed, and human control of aircraft pitch angle is shortly discussed illustrating the use of level crossing results. (Author)

A74-45312 * Irregular bilayer structure in vesicles prepared from Halobacterium cutirubrum lipids. J. K. Lanyi (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.). *Biochimica et Biophysica Acta*, vol. 356, 1974, p. 245-256. 24 refs.

Fluorescent probes were used to study the structure of the cell envelope of Halobacterium cutirubrum, and, in particular, to explore the effect of the heterogeneity of the lipids in this organism on the structure of the bilayers. The fluorescence polarization of perylene was followed in vesicles of unfractionated lipids and polar lipids as a function of temperature in 3.4 M solutions of NaCl, $NaNO_3$, and KSCN, and it was found that vesicles of unfractionated lipids were more perturbed by chaotropic agents than polar lipids. The dependence of the relaxation times of perylene on temperature was studied in cell envelopes and in vesicles prepared from polar lipids, unfractionated lipids, and mixtures of polar and neutral lipids. P.T.H.

A74-45313 * Comparison of media for detection of fungi on spacecraft. C. M. Herring, J. W. Brandsberg, G. S. Oxborrow, and J. R. Puleo (U.S. Public Health Service, Center for Disease Control, Cape Canaveral, Fla.). *Applied Microbiology*, vol. 27, Mar. 1974, p. 566-569. 8 refs. NASA Order W-13062.

Five media, including Trypticase soy agar (TSA; BBL) pour plates, spread plates of TSA, Mycophil agar with chloromycetin, Mycophil agar with chloromycetin and Actidione, and cornmeal agar with chloromycetin were quantitatively and qualitatively compared for the detection of fungi on spacecraft. Cornmeal agar with chloromycetin yielded the highest number of fungal colonies, although not always significantly higher than Mycophil agar with chloromycetin or TSA spread plates. Cornmeal agar with chloromycetin also gave the best qualitative representation of fungi on the spacecraft, recovering 68% of the genera found from all media. This medium yielded 10 times the number of fungal colonies and 3 times the number of genera found on TSA pour plates as currently used for spacecraft assay. (Author)

A74-45314 * Evaluation of membrane filter field monitors for microbiological air sampling. N. D. Fields, G. S. Oxborrow, J. R. Puleo, and C. M. Herring (U.S. Public Health Service, Center for

Disease Control, Cape Canaveral, Fla.). *Applied Microbiology*, vol. 27, Mar. 1974, p. 517-520. NASA Order W-13062.

Due to area constraints encountered in assembly and testing areas of spacecraft, the membrane filter field monitor (MF) and the National Aeronautics and Space Administration-accepted Reyniers slit air sampler were compared for recovery of airborne microbial contamination. The intramural air in a microbiological laboratory area and a clean room environment used for the assembly and testing of the Apollo spacecraft was studied. A significantly higher number of microorganisms was recovered by the Reyniers sampler. A high degree of consistency between the two sampling methods was shown by a regression analysis, with a correlation coefficient of 0.93. The MF samplers detected 79% of the concentration measured by the Reyniers slit samplers. The types of microorganisms identified from both sampling methods were similar. (Author)

A74-45315 * Simple device for automatically transferring broth cultures. J. R. Wilkins and S. M. Mills (NASA, Langley Research Center, Hampton, Va.). *Applied Microbiology*, vol. 27, Mar. 1974, p. 612.

A74-45316 * Mathematical estimation of the level of microbial contamination on spacecraft surfaces by volumetric air sampling. G. S. Oxborrow, A. L. Roark, N. D. Fields, and J. R. Puleo (U.S. Public Health Service, Center for Disease Control, Cape Canaveral, Fla.; Sandia Laboratories, Albuquerque, N. Mex.). *Applied Microbiology*, vol. 27, Apr. 1974, p. 706-712. 11 refs. NASA Order W-13062.

Microbiological sampling methods presently used for enumeration of microorganisms on spacecraft surfaces require contact with easily damaged components. Estimation of viable particles on surfaces using air sampling methods in conjunction with a mathematical model would be desirable. Parameters necessary for the mathematical model are the effect of angled surfaces on viable particle collection and the number of viable cells per viable particle. Deposition of viable particles on angled surfaces closely followed a cosine function, and the number of viable cells per viable particle was consistent with a Poisson distribution. Other parameters considered by the mathematical model included deposition rate and fractional removal per unit time. A close nonlinear correlation between volumetric air sampling and airborne fallout on surfaces was established with all fallout data points falling within the 95% confidence limits as determined by the mathematical model. (Author)

A74-45317 * On a fundamental problem in radiation biology. V. Dugan and R. Trujillo (Sandia Laboratories, Albuquerque, N. Mex.). *Journal of Theoretical Biology*, vol. 44, 1974, p. 397-401. 15 refs. NASA Order W-12853.

Experimental evidence indicates that the radiation dose required to reduce a surviving population to a certain fraction of its original population is lower for vertebrate cells than for viruses. On the other hand, the number of ionizations per cell required to inactivate that cell is greater for vertebrate cells than for viruses. The apparent conflict between these two findings is investigated. It is found that the apparent contradiction is probably a result of the fractional power dependence of the radiation-dose value on the nucleic acid weight. G.R.

A74-45477 Detectability of a luminance increment. T. E. Cohn, L. N. Thibos, and R. N. Kleinstein (California, University, Berkeley, Calif.). *Optical Society of America, Journal*, vol. 64, Oct. 1974, p. 1321-1327. 18 refs. Grant No. NIH-FR-7006.

Experimental study of the psychometric function for the detection of a foveal luminance increment in human observers. The results of the study suggest that the human observer acts like an ideal photodetector that has imperfect memory concerning the signal to be detected. M.V.E.

A74-45548 # A review of some research relating to controller selection criteria. B. B. Cobb (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). In: What impacts ATC; Proceedings of the Eighteenth Annual Meeting and Technical Program, Miami Beach, Fla., October 15-18, 1973. Washington, D.C., Air Traffic Control Association, Inc., 1974, p. 43-47.

The variables most useful for the selection of ATC trainees from among medically qualified applicants have been identified as chronological age, performance measures on certain types of aptitude tests, and assessments of previous types and amounts of prior ATC experience, usually attained as military controllers. Variables pertaining to level, recency, or type of education have not been found useful for predicting early training performance or retention-attrition status up to 10 years after entry. G.R.

A74-45773 Transfer of adaptation to rotation of the visual field. C. W. McIntyre (Virginia, University, Charlottesville, Va.) and H. L. Pick, Jr. (Minnesota, University, Minneapolis, Minn.). *Journal of Experimental Psychology*, vol. 103, Oct. 1974, p. 782-791. Research supported by the University of Minnesota and Center for Advanced Study in the Behavioral Science; Grant No. PHS-HD-03082.

Experiments on adaptation to rotation of the visual field are presented. All are similar in that they restrict movement during exposure to the visual rotation to one direction and subsequently test for adaptation with movements in other directions. Positive transfer of adaptation to the new directions was found in all experiments. The amount of adaptation was found to vary in a curvilinear pattern as a function of the difference between the exposure direction and the new directions. Moreover, this curvilinear pattern reflects the predominant contribution of a motor or proprioceptive component to visual-motor adaptation. The implications of these results for integrated perceptual-motor coordination systems are discussed. (Author)

A74-45782 Physiological and conventional breath-hold breaking points. Y. C. Lin, D. A. Lally, T. O. Moore, and S. K. Hong (Hawaii, University, Honolulu, Hawaii). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 291-296. 27 refs. Research supported by the Hawaii Thoracic Society; NSF Grant No. GH-93.

Study of the course of breath-hold (BH) characterized by involuntary ventilatory activity (IVA) with glottis closed. The intraesophageal pressure (IEP), BH time, and oxygen-demand relationship, and factors responsible for the onset of IVA were studied during BH with air and BH with oxygen at rest and during steady-state exercise at 167 kgm per min. IVA generates periodic subatmospheric pressure in the thoracic cavity, while at the onset of BH the IEP is above ambient. The effect of this periodic subatmospheric intrathoracic pressure on the cardiovascular functions is discussed. It is concluded that the onset of IVA is dependent on arterial CO2 pressure and on oxygen consumption, is nonsubjective, and serves as a physiological breaking point for the BH. (Author)

A74-45783 Control of the retinal circulation at altitude. R. Frayser, G. W. Gray, and C. S. Houston (Arctic Institute of North America Facility, Kluane Lake, Yukon Territory, Canada; South Carolina, Medical University, Charleston, S.C.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 302-304. 22 refs. Grants No. NIH-EY-01093; No. NIH-HL-14102.

Retinal blood flow was measured in six normal volunteers who had been at an altitude of 17,500 ft for five to nine days. At an arterial blood oxygen saturation of 70 plus or minus 3% retinal flow was double that normally observed at sea level. Restoration of arterial oxygen saturation to 95 plus or minus 1% at the prevailing arterial CO2 pressure of 24 mmHg resulted in a decrease of retinal flow to approximately sea-level values. There is a significant decrease in retinal flow after nine days at altitude as compared to five days. These findings suggest that the tone of the retinal vessels may become reset at the prevailing CO2 tension and that hypoxia becomes the predominant controlling factor in regulating retinal flow at altitude. (Author)

A74-45784 Cerebral glucose metabolism and cerebral blood flow in high-altitude residents. S. C. Sorensen, N. A. Lassen, J.

W. Severinghaus, J. Coudert, and M. P. Zamora (Copenhagen, University; Bispebjerg Hospital, Copenhagen, Denmark; California, University, San Francisco, Calif.; Instituto Boliviana de Biologia de la Altura, La Paz, Bolivia). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 305-310. 25 refs. Research supported by the World Health Organization and Foundation for Advancement of Medical Science; Grant No. NIH-HE-06285.

The present study was performed to evaluate the hypothesis that an increased H(+) production by the brain from lactic acid formation during hypoxia plays a role in the lowering of the bicarbonate concentration. Twenty-three high-altitude residents were studied in La Paz, Bolivia (altitude 3800 m). While the subjects were breathing ambient air 3.66% of the glucose consumed was metabolized anaerobically, which is similar to that found in man at sea level. Furthermore, the lactate production was not different when the subjects had been breathing oxygen for one hour prior to the measurements. Thus the study does not support the view that an increased anaerobic glycolysis plays a role in the lowering of the bicarbonate concentration in brain extracellular fluid at this altitude. (Author)

A74-45785 **Effect of artificial ventilation on lung mechanics in dogs.** F. G. Douglas, P. Y. Chong, and D. C. Finlayson (St. Michael's Hospital; Toronto, University, Toronto, Canada). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 324-328. 30 refs. Research supported by the St. Michael's Research Society.

Dynamic lung compliance and intrathoracic gas volume were measured in 11 anesthetized spontaneously breathing mongrel dogs. Immediately thereafter, control of ventilation was begun with intermittent positive pressure in four dogs and with intermittent negative pressure at the body surface in the other seven, and sequential measurements were made of dynamic lung compliance, thoracic gas volume, and alveoloarterial oxygen difference. Positive-pressure ventilation resulted in a marked reduction in lung compliance and a progressive decline in lung volume, whereas negative-pressure breathing produced a small decrease in compliance but no loss of lung volume. Alveoloarterial oxygen difference was larger during positive- than negative-pressure ventilation. (Author)

A74-45786 # **Systolic time intervals during lower body negative pressure.** T. B. Graboys, F. J. Forlini, Jr., and E. D. Michaelson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 329-332. 13 refs. Project 7930-03-25.

Systolic time intervals (STI) were used to assess changes in left ventricular function (LVF) among male volunteers exposed to lower-body negative pressure (LBNP). Significant prolongation of the preejection period (PEP), shortening of the left ventricular ejection time (LVET), and, increasing PEP/LVET ratios were observed during exposure to both 40 and 50 mm Hg negative pressure. Changes in preload, contractility, and afterload may account for the observed findings. STIs appear to provide a reliable noninvasive method for examining both rapid and prolonged changes in LVF during exposure to LBNP. (Author)

A74-45787 * **Physiological responses to heat of resting man with impaired sweating capacity.** G. L. Totel (St. Louis University, St. Louis, Mo.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 346-352. 31 refs. Grant No. NGR-26-006-039.

The effects of total-body heat exposure were studied in three groups of subjects with varied degrees of impaired sweating capacity. The responses of two ectodermal dysplasic men, six quadriplegic men, and a man with widespread burned scar tissue were compared with the responses of three able-bodied men resting in the heat. It was found that the able-bodied and burned subjects competed successfully with a controlled environment of 38 C and 20% relative humidity for up to 150 min, whereas the quadriplegic and ectodermal dysplasic men developed hyperthermia, hyperventilation, and distress after only 120 and 75 min of heat exposure, respectively. The intolerance to heat is thus ascribed directly to the inability to produce and evaporate sweat. (Author)

A74-45788 **Posthyperventilation breathing patterns after active hyperventilation in man.** F. D. Tawadrous (Stanford University, Stanford, Calif.) and F. L. Eldridge (Palo Alto Veterans Administration Hospital, Stanford, Calif.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 353-356. 12 refs. Research supported by the Palo Alto Veterans Administration Hospital; Grant No. PHS-NS-09390.

The posthyperventilation breathing patterns after active voluntary hyperventilation (HV) were determined in 30 subjects, of whom 16 were physiologically naive, ten knowledgeable in the area of respiratory physiology, and four patients with chronic obstructive pulmonary disease. After active HV of 10 to 15 sec duration, apnea occurred in the immediate post-HV period in only one run of 180 performed, and ventilation was almost always maintained for the first 10 to 20 sec of recovery at a higher level than control, despite a significant lowering of end-tidal CO2 pressure. The study duplicates in awake humans observations made in anesthetized cats and supports the conclusion that a central neural mechanism connected with active breathing supplies sufficient neural facilitation to prevent the apnea associated with the decrease in chemical stimulation. (Author)

A74-45789 **Hematologic and biochemical effects of simulated high altitude on the Japanese quail.** J. J. Jaeger and J. J. McGrath (Rutgers University, New Brunswick, N.J.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 357-361. 37 refs.

Adult Japanese quail were exposed to a simulated high altitude of 6100 m for four weeks. Control animals were maintained under similar conditions at an altitude of 40 m. Body weights, hematocrit ratios, and hemoglobin concentrations were determined weekly. At the end of the exposure, 24-hr fasting whole blood and plasma glucose concentrations, plasma volumes, blood volumes, cardiac and skeletal muscle carbohydrate contents, and intraerythrocytic inositol hexaphosphate (IHP) concentrations were determined. Body weights of both experimental and control birds decreased during the exposure period. Hematocrit ratios, hemoglobin concentrations, blood volumes, and cardiac and skeletal muscle carbohydrate contents were significantly greater in the altitude group. Significant right heart hypertrophy occurred in the altitude quail. Plasma volumes and IHP concentrations did not differ significantly in exposed and control birds. Fasting blood glucose levels were significantly lower in the altitude-exposed birds. (Author)

A74-45790 **Lung growth induced by hypoxia.** E. L. Cunningham, J. S. Brody, and B. P. Jain (Pennsylvania, University, Philadelphia, Pa.; Boston University, Boston, Mass.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 362-366. 26 refs. Grant No. PHS-HL-15063.

Newborn, three-week, and nine-week-old rats were exposed to 12.5% oxygen for 21 days. Body weight and the weight of most organs decreased in hypoxic rats compared to age-matched controls. In contrast, lung weight per body weight ratios increased in all rats exposed to hypoxia, and absolute lung weight increased in animals exposed at three and nine weeks of age. Total lung capacity increased in all hypoxic animals, averaging 157%, 120%, and 122% of values predicted on the basis of body size in rats exposed at birth and three and nine weeks, respectively. Morphometric studies in newborn rats showed that hypoxia produced an increase in the number and size of alveoli and alveolar ducts. In adult rats, hypoxia produced an increase in size but not in the number of structures. Hypoxic lung growth was permanent and did not suppress normal growth of the lung. (Author)

A74-45791 **Peripheral modification of thermoregulatory function during heat acclimation.** W. Y. Chen and R. S. Elizondo (Indiana University, Bloomington, Ind.). *Journal of Applied Physiology*, vol. 37, Sept. 1974, p. 367-373. 35 refs. Grants No. DADA17-68-C-8066; No. AF-AFOSR-72-2383.

By applying a constant electrical stimulus to a forearm area in a cool environment before and after acclimation, it was demonstrated that, after acclimation, a greater amount of sweat output was obtained by the stimulation. The postacclimation sweat increment

observed during the local electrical stimulation in the cold was identical to that observed under a constant whole-body heat stress. It was also demonstrated that the sweat increment was totally prevented by local treatment of low temperatures during heat acclimation. On the other hand, persistent local sweating, induced by electrical stimulation or by iontophoresis of ACh or Mecholyl, was not followed by a higher sweat output in the subsequent heat exposures. Repeated local heating also failed to produce a significant change in the sweat output. (Author)

A74-45792 Influence of photic input on circadian rhythms in man. M. L. Simenhoff (Thomas Jefferson University, Philadelphia, Pa.). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 374-377. 8 refs. Research supported by the General Clinical Research Centers.

Excretory cycles of sodium, chloride, and potassium in blind subjects were compared with cycles of normal subjects under normal environmental conditions. These cycles were normal in blind subjects with light/dark perception. Major cycle changes were observed in subjects with total blindness. The amplitude of the potassium cycle was greatly decreased, and the cycle may have been absent. The phase of the sodium cycle was shifted approximately 12 hr while that of chloride was shifted less regularly. Comparison of subjects totally blind from birth with those having acquired total blindness suggests, but does not prove, that cycle and phase changes are greater in the former. The difference between the two groups suggests the importance of photic input per se as distinct from sleep-wake or activity cycles as a significant entraining agent. (Author)

A74-45793 Regional lung function in calves during acute and chronic pulmonary hypertension. A. V. Ruiz, G. E. Bisgard, I. B. Tyson, R. F. Grover, and J. A. Will (Wisconsin, University, Madison, Wis.; Colorado, University, Denver, Colo.). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 384-391. 37 refs. Research supported by the University of Wisconsin; Grant No. PHS-HL-13154.

Measurement of regional pulmonary blood flow, alveolar ventilation, and the ratio of the latter to the former at sea level with Xe-133 in nine unanesthetized Holstein calves born at sea level, eight of which were restudied after two and four weeks at 3400 m altitude. Control studies at sea level demonstrated a distribution of relative regional pulmonary blood flow and ventilation per unit volume of lung decreasing dorsoventrally, while the ventilation/blood flow ratio increased in the same direction. Inhalation of 100% O2 at sea level reversed the distribution of pulmonary blood flow and the above-mentioned ratio. Acute hypoxia (oxygen pressures of 104 and 55 mm Hg) failed to cause significant zonal shifts of pulmonary blood flow at sea level. After four weeks at high altitude the lung was almost homogeneous with reference to pulmonary blood flow distribution and with respect to the ventilation/blood flow ratio. The regional distribution for the ventilation at altitude was similar to that recorded at sea level. (Author)

A74-45794 Development of and recovery from fatigue induced by static effort at various tensions. C. F. Funderburk, S. G. Hipskind, R. C. Welton, and A. R. Lind (St. Louis University, St. Louis, Mo.). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 392-396. 15 refs. Contract No. F33615-71-C-1320.

In each experiment, each of three subjects exerted five successive, isometric, handgrip contractions at 20, 40, or 60% maximal voluntary contraction (MVC) to the point of fatigue. The interval between the successive contractions in any one experiment was kept constant at 3, 7, 11, 20, or 40 min. At each tension the duration of the successive contractions fell at first but reached a steady-state duration by the fourth and fifth contraction. That steady-state value was shortest when the interval was shortest, but even with the longest interval the final contraction still only reached 85 to 90% of the original duration. Compared to the duration of the first contraction, the fall in duration of the final contraction was inversely related, proportionately, with the tension, and this difference was greatest when the interval between the contractions was least. (Author)

A74-45795 Evaluation of stagnant pulmonary capillary blood during breath holding in dogs. R. Abboud, G. Andersson, and R. F. Coburn (Pennsylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 397-409. 28 refs. Grant No. NIH-HE-10331.

A method is developed for estimating the volume of stagnant blood in pulmonary capillaries, based on measurement of the uptake from alveolar gas of two isotopes of carbon monoxide during breath holding, where one isotope was present in blood prior to breath holding. It is shown that, under this condition, uptake rates of the two isotopes (relative to their alveolar concentrations) will be similar in well perfused capillaries; however, in stagnant blood, the uptake of the isotope previously present in blood will be decreased (relative to its alveolar concentration) compared to the other isotope. Therefore the presence of stagnant blood can be detected from simultaneous measurements of uptake of the two isotopes. The method was validated by a computer analysis and in dog experiments where the circulation to the left lung was stopped. (Author)

A74-45796 # Evaluation of a new low-resistance breathing valve. J. B. Lenox and E. Koegel (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 410-413.

The tricuspid Y breathing valve was developed to overcome deficiencies in high-velocity breathing valves currently used in exercise studies. Special tests were devised to evaluate comprehensively the physical characteristics of a Y valve, a modified Otis-McKerrow valve, and a triple-J valve. The Y valve had less dead space and lower resistance to high flow rates and was smaller and lighter than the other two valves. In contrast to the significant leak rates noted for the triple-J valve, the leak rate of the Y valve was negligible. The leak rates of the modified Otis-McKerrow valve, when supported in a vertical plane, were zero. (Author)

A74-45797 A flexible catheter-type oxygen sensor. R. F. Huxtable and I. Fatt (California, University, Berkeley, Calif.). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 435-438.

The construction and performance of flexible monopolar and bipolar polarographic oxygen sensors that can be inserted into blood vessels or tissue through an 18-gauge thin-wall needle or a 5F catheter are described. The sensor is constructed of ultrathin-wall Teflon tubing so that it can be threaded for long distances into blood vessels. The monopolar sensor has a gel-covered tip. The bipolar electrode tip is covered by a membrane that is held in place by a shrink fit so there is no possibility of its loss in the blood vessels. The electrode current for both electrodes is about 0.03 nA/torr, which is about the same as for the conventional Clark-type sensor; the response time (to 90% of final current) is about 1 sec or less in gas; in a blood vessel the response time is less than 2 sec. (Author)

A74-45798 An Ag-Pb galvanic cell oxygen pressure electrode for blood-gas analysis. C. E. W. Hahn (Oxford University, Oxford, England). *Journal of Applied Physiology,* vol. 37, Sept. 1974, p. 439-442. 15 refs.

The construction of an Ag-Pb galvanic cell suitable for blood-gas analysis is described. The accuracy of the cell has been investigated using Wösthoff gas mixing pumps, and linearity and error plots are presented for a wide oxygen pressure range. Electrochemical reasons are put forward to suggest that the time response of a galvanic cell ought to be quicker than that of a conventional Clark electrode, and results are presented comparing time responses for the two types of electrode. (Author)

A74-45799 **Sounds of the heart in diastole.** J. I. Martinez-Lopez (Louisiana State University; Louisiana, Charity Hospital, New Orleans, La.). *American Journal of Cardiology,* vol. 34, Oct. 3, 1974, p. 594-601. 75 refs.

Cardiac diastole usually is acoustically silent even though several hemodynamic events take place in this phase of the cardiac cycle. In some healthy subjects and in many patients with cardiovascular alterations one or more 'extra' heart sounds may be heard in diastole, and in them the distinction between normal and abnormal heart sounds must be established. In general, diastolic sounds may be spontaneous in nature or iatrogenic, that is, a consequence of replacement of the atrioventricular (A-V) valve with a caged-poppet prosthesis or a result of pervenous pacemaker implantation. The majority of the sounds emanate from the chambers of the heart. This presentation discusses normal and abnormal ventricular filling sounds, opening snap, 'tumor plop', pericardial knock, prothetic A-V valve click and pacemaker-induced sound. (Author)

A74-45800 **Effects of cerebral angiography, pneumoencephalography, myelography and ventriculography on the electrocardiogram.** G. E. Burch (Tulane University, New Orleans, La.) and P. Breaux (Louisiana, Charity Hospital, New Orleans, La.). *American Journal of Cardiology,* vol. 34, Oct. 3, 1974, p. 602-605. 6 refs. Research supported by the Rudolph Matas Memorial Fund, Rowell A. Billups Fund for Research in Heart Disease, and Feazel Laboratory; Grant No. NIH-HL-06769.

The electrocardiograms of 50 patients were recorded immediately before and after they underwent cerebral angiography, ventriculography, myelography or pneumoencephalography. Definite electrocardiographic changes were produced by the diagnostic procedure in 78 percent of patients. Cerebral angiography caused the most serious electrocardiographic alterations, one patient manifesting the Wolff-Parkinson-White syndrome after the procedure. The alterations ranged from slight to marked P, QRS or T wave changes, alone or in combination. The electrocardiographic alterations produced by the four central nervous system diagnostic procedures were probably mediated through parasympathetic and sympathetic cardiac innervation. (Author)

A74-45841 **Considerations of eye-safety in intense diffuse illumination.** I. N. Ross (Aeronautical Research Council, National Physical Laboratory, Teddington, Middx., England). *Optics Communications,* vol. 12, Sept. 1974, p.46-50. 6 refs.

The probability of marginal damage to one receptor of the retina is calculated for the case of coherent diffuse illumination of the eye. The effect of 'speckle' is estimated and the illumination is not restricted to that from a lambertian diffuser. An arrangement employing a ruby laser illuminator, which has been used for holography, is assessed and shown to be safe in terms of the present Codes of Practice. (Author)

A74-45850 * **Responses evoked from man by acoustic stimulation.** R. Galambos, K. Hecox, and T. Picton (California, University, La Jolla, Calif.). *San Diego Biomedical Symposium, San Diego, Calif., Feb. 6-8, 1974, Paper.* 2 p. 16 refs. Research supported by the Medical Research Council of Canada; Grants No. NGR-05-009-198; No. PHS-NS-10482-02.

Clicks and other acoustic stimuli evoke time-locked responses from the brain of man. The properties of the waves recordable within the interval from 1 to 10 msec after the stimuli strike the eardrum are discussed along with factors influencing the waves in the 100 to 500 msec epoch. So-called brainstem responses from a normal young adult are considered. No waves were observed for clicks to weak to be heard. With increasing stimulus strength the waves become larger in amplitude and their latency shortens. G.R.

A74-45902 # **Metabolic state and blood flow in rat cerebral cortex, cerebellum and brainstem in hypoxic hypoxia.** V. MacMillan, L. G. Salford, and B. K. Siesjo (Lund, University Hospital, Lund, Sweden). *Acta Physiologica Scandinavica,* vol. 92, Sept. 1974, p. 103-113. 34 refs. Research supported by the Swedish Medical Research Council, Swedish Bank Tercentenary Fund, and Harald and Greta Jeanssons Stiftelse; Grant No. PHS-5-R01-NS-07838-05. SMRC Project 14X-263; SMRC Project 14X-2179.

In order to study the effect of hypoxic hypoxia upon regional cerebral metabolism and blood flow, the arterial oxygen partial pressure of lightly anesthetized rats was lowered to about 35, 29, and 23 mm Hg, respectively, with subsequent measurements of labile metabolites and blood flow in cerebral cortex, cerebellum, and brain stem. The metabolites, which included organic phosphates, carbohydrate substrates, and amino acids, were measured with enzymatic, fluorometric techniques after freezing the tissue in situ, and the regional blood flow was estimated from the tissue uptake of C-14 ethanol. In all three regions marked hypoxia (oxygen partial pressure of 23) gave rise to small increases in the ADP concentration, but since neither ATP nor AMP was changed from the normal it is concluded that the energy state remained essentially unaltered. Since the regional blood flow also increased to a similar extent in the three regions it is concluded that brain regions show similar metabolic and circulatory changes in hypoxic hypoxia. (Author)

A74-45903 **The influence of figure size and orientation on the magnitude of the horizontal-vertical illusion.** J. G. Thompson and H. R. Schiffman (Rutgers University, New Brunswick, N.J.). *Acta Psychologica,* vol. 38, Oct. 1974, p. 413-420. 16 refs. Research supported by Rutgers University.

Two experiments designed to test the validity of the Kunnapas (1957) visual field hypothesis in terms of revealing the effects of figure size and figure orientation on horizontal vertical illusion (HVI). Accordingly, the HVI is produced by the perimetric dimensions of the binocular visual field superimposed over the focal HVI figure. In the two experiments performed, a circular frame was employed while the overall size and retinal orientation of the stimulus figures varied. In the first experiment the orientation of the HVI figures were kept constant while the figure size varied. The main effects produced occured only to figure size where the HVI magnitude was found to be greater for the smaller series of figures than for the larger series. In the second experiment the relation of the stimulus figure and its surrounding frame was kept constant but the orientation of the HVI figures varied. Here, the perspective theory of HVI aided in the explanation of the data obtained, showing the influence of variations in figural orientation. From these experiments the realization that there is no single determinant of the HVI may be assumed. T.S.

A74-45912 # **Mathematical problems in biology (Matematicheskie problemy v biologii).** S. V. Fomin and M. B. Berkinblit. Moscow, Izdatel'stvo Nauka, 1973. 200 p. 89 refs. In Russian.

Study of mathematical methods used in biological, in particular, physiological, investigations. General principles of the mathematical approach to the study of living organisms are set forth. The role of electronic computers in biological research is discussed, and examples of computer use in data evaluation and in biological system simulation are described. Considerable attention is given to the description of various mathematical models of biological systems and mechanisms, including models of the neuron, the visual system, embryonic development, and intracellular processes. Finally, the questions of self-reproduction and artificial intelligence are briefly discussed. P.T.H.

A74-45913 # **Life processes and hydrostatic pressure (Zhiznennye protsessy i gidrostaticheskoe davlenie).** A. E. Kriss. Moscow, Izdatel'stvo Nauka, 1973. 272 p. 500 refs. In Russian.

Systematic review, summary, and critical discussion of experimental findings published throughout the world literature on the biological effects of high hydrostatic pressures, particularly upon proteins, nucleic acids, enzymes, various animal tissues, viruses, animals, plants, microorganisms, and higher life forms. A considerable portion of the book covers the original research work of the author and his group colleagues on the metabolism physiology of microorganisms grown under pressures of several hundred atmospheres. The book is intended for microbiologists, biochemists, virologists, and hydrobiologists. M.V.E.

A74-46058 **The visibility of gratings - Spatial frequency channels or bar-detecting units.** I. D. G. Macleod and A. Rosenfeld (Maryland, University, College Park, Md.). *Vision Research*, vol. 14, Oct. 1974, p. 909-915. 37 refs. NSF Grant No. GJ-32258X.

Experimental data interpreted as evidence for the existence in the human visual system of channels selectively sensitive to narrow bands of spatial frequencies are considered, and a simple space-domain model is presented that accounts for much of these experimental data. The model assumes the presence in the visual system of bar-detecting units whose receptive fields have various sizes and orientations with the maximum response from any unit to a given stimulus determining the visibility of that stimulus. M.V.E.

A74-46059 **Visibility of continuous luminance gradients.** J. J. McCann, R. L. Savoy, J. A. Hall, Jr., and J. J. Scarpetti (Polaroid Vision Research Laboratory, Cambridge, Mass.). *Vision Research*, vol. 14, Oct. 1974, p. 917-927. 21 refs.

A plateau of illumination was modulated with various patterns of gradual change: linear slopes and small numbers of low spatial frequency sinusoidal oscillations. Over the range of parameters tested, the threshold contrast necessary for the detection of these modulations was found to be largely independent of the steepness of the gradient, the frequency of the sinusoids, and the size of the target on the retina. Visibility was found to be a function of the fractional change in luminance across the target (contrast) and the pattern of the modulation (characterized by the number of cycles of sinusoid). (Author)

A74-46060 **Size-tuned mechanisms - Correlation of data on detection and apparent size.** F. M. Bagrash, J. P. Thomas, and K. K. Shimamura (California, University, Los Angeles, Calif.). *Vision Research*, vol. 14, Oct. 1974, p. 937-942. 7 refs. Grants No. PHS-EY-00360; No. PHS-EY-51962-01A1.

Detection thresholds were obtained for uniformly illuminated and non-uniformly illuminated (disk-annulus) stimuli. Then, the stimuli were presented at threshold and observers attempted to discriminate between uniform and non-uniform stimuli, and also made judgments of the apparent size of each stimulus. The uniform and non-uniform stimuli were not discriminated. Changes in apparent size were correlated with changes in detection thresholds. These findings support a multiple size-tuned mechanism interpretation. (Author)

A74-46061 **Scaling of large chromatic differences.** F. Ward and R. M. Boynton (Rochester, University, Rochester, N.Y.). *Vision Research*, vol. 14, Oct. 1974, p. 943-949. 15 refs. Grant No. NIH-EY-00187.

Minimally-distinct borders between juxtaposed heterochromatic fields are evaluated by equivalent achromatic contrasts or by subjective ratings and are in each case subjected to the Shepard-Kruskal multidimensional scaling analysis. The results of the analysis show that the original stimuli can be orderly arrayed in a two-dimensional space on the basis of their sensory differences. Objective and subjective border ratings produce similar results. The MDB technique is shown to produce color scaling data that closely resemble those obtained by Guth with the subthreshold additivity method. The data provide additional information concerning the scaling of large sensory differences between spectral colors. (Author)

A74-46062 **The Stiles-Crawford colour change.** W. Wijngaard, M. A. Bouman, and F. Budding (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). *Vision Research*, vol. 14, Oct. 1974, p. 951-957. 25 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

To obtain the Stiles-Crawford color change, the absorption of guided and unguided light by a cone outer segment as a function of the angle of incidence is estimated. The model is specified in two ways: the HE-(1,1) model, based on a waveguide modal analysis, and the geometrical optics model. The measurements by Stiles (1937) are fitted with reasonable success, both for the intensity effect and for the color change, using the phenomenon of self-screening to explain the color change. (Author)

A74-46063 **Correlation analysis of EEG and eye movements in man (Korrelationsanalyse von EEG und Augenbewegungen beim Menschen).** V. Reiman, M. Korth, and W. D. Keidel (Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Vision Research*, vol. 14, Oct. 1974, p. 959-963. 27 refs. In German.

Results obtained in simultaneously conducted measurements of EEG and eye movements were evaluated with the aid of correlation methods. It was found that EEG and eye movement frequencies are identical for certain frequencies in the range from 8 to 13 Hz. The correlation between EEG and eye movement depends on the considered frequency and the magnitude of the optical afference. For the frequency range from 8 to 13 Hz a good correlation is observed in the case of low optical afference and a poor correlation in the case of high optical afference. The opposite effect occurs in the low-frequency range. G.R.

A74-46064 **Stereopsis with chromatic contours.** J. P. Comerford (California, University, Santa Barbara, Calif.). *Vision Research*, vol. 14, Oct. 1974, p. 975-982. 18 refs. Research supported by the University of California; Grant No. NIH-EY-00666.

In this experiment stereopsis occurred for stimuli defined by chromatic contours. A chromatic contour was defined as a contour formed by a spatial chromatic change with the chromatic components heterochromatically equated using the criterion of a minimally distinct border. Discrimination differed for different combinations of target and background hue. Discrimination was better when the stereoscopic target was at a 30-min binocular disparity than at a 7-min binocular disparity. It was suggested that the discrimination level was related to the distinctness of border of the target against the background for a given magnitude of binocular disparity. Several theories of the cue to stereopsis were discussed in regard to the findings of this experiment. (Author)

A74-46065 **Simultaneous brightness contrast in stereoscopic space.** T. Gibbs and R. B. Lawson (Vermont, University, Burlington, Vt.). *Vision Research,* vol. 14, Oct. 1974, p. 983-987. 15 refs. NSF Grant No. GB-30579; Grant No. NIH-R01-00849-01.

Results of an experiment in which the depth and lateral displacement between the test and inducing fields of a classical simultaneous brightness contrast configuration were manipulated. Depth separation varied with the binocular disparity carried by the test fields, whereas directional displacement arose from decentration of the test fields. Neither depth nor lateral displacement influenced the magnitude of simultaneous brightness contrast although stereoscopic size and distance varied directly with disparity. The present results indicate that simultaneous brightness contrast is not affected by depth adjacency. (Author)

A74-46066 **Relation between border enhancement extent and retinal image blur.** A. Remole (Waterloo, University, Waterloo, Ontario, Canada). *Vision Research,* vol. 14, Oct. 1974, p. 989-995. 10 refs.

A bright field on a dark ground is perceived as having a region of enhanced brightness adjacent to its borders. The spatial extent of this region is compared with the extent of blur of the borders in the retinal image. In agreement with Mach band theory, the two variables are found to be closely related. Only for large entrance pupils is the enhancement extent markedly smaller than half the blur zone. It is suggested that this is because it follows the physiologically effective portion of the blur zone rather than the oblique incidence light constituting the periphery of the optical spread. (Author)

A74-46067 **Suppression of visual phosphenes during saccadic eye movements.** L. A. Riggs, P. A. Merton, and H. B. Morton (National Hospital, London, England). *Vision Research,* vol. 14, Oct. 1974, p. 997-1011. 50 refs.

A loss of visual sensitivity is shown to accompany a saccadic eye movement even under conditions of total darkness. Optical factors are eliminated by the use of electrically produced phosphenes, rather than flashes of light, to test the changes in visual threshold. Separate experiments matching the brightness of electrical phosphenes to real lights allow the threshold changes to be expressed in terms of real light. The results point to the conclusion that a substantial portion of saccadic suppression is neural, rather than optical in its origin. The time course of the suppression is consistent with electrophysiological studies in cat and monkey in which inhibition of nerve impulses occurs over a period that includes, but is considerably longer than the duration of the eye movement. No correlation has yet been shown, however, between the occurrence of saccadic suppresion and identifiable features of the human visually evoked occipital responses. Saccades of a given amplitude are found to be slower in total darkness. (Author)

A74-46068 **The absorption of light in an idealized photoreceptor on the basis of waveguide theory. I - The infinite dielectric cylinder.** W. Fischer and R. Röhler (München, Universität, Munich, West Germany). *Vision Research,* vol. 14, Oct. 1974, p. 1013-1019.

As an approximative model of a photoreceptor, the electromagnetic excitation of an infinite dielectric cylinder by plane light waves has been investigated. The angle of incidence and the direction of polarization have been varied. The solution has been worked out on the basis of the theory of Maxwell, the absorbing medium being described by a complex dielectric constant. For three different values of the absorption and the receptor diameter the energy absorbed in the receptor has been calculated as a function of the angle of incidence and the direction of polarization. This has been done for the relative energies in the individual modes and for the total energy. The results are compared with the predictions of the geometrical optical theory which proves that the latter does not correctly describe the absorption. (Author)

A74-46069 **Edge detection in luminance and colour discrimination.** I. Rentschler and W. Arden (München, Universität, Munich, West Germany). *Vision Research,* vol. 14, Oct. 1974, p. 1043-1045. 15 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Luminance difference thresholds for bipartite fields of various shape were studied experimentally as a function of blur of the dividing line. Threshold-blur functions of color discrimination (Rentschler, 1973) revealed spatial summation immediately beyond the zero-blur condition, whereas threshold-blur functions of luminance discrimination revealed spatial summation only above 0.7 deg gradient width. Thus the color discrimination mechanism appears to be similar (at all blur conditions) to the mechanism of luminance discrimination at very diffuse boundaries (i.e., edge detection is not essential for transfer of color differences). This conclusion is in line with results obtained by van der Horst, de Weert, and Bouman (1967) and by van der Horst (1969), according to which there are no inhibitory qualities in the chromatic sensitivity function, and that (Dow and Gouras, 1973) cortical neurons of primates are selective either for color or spatial properties, but not for both. V.P.

A74-46070 **On the origin of changes in the horopter deviation.** R. Jones (Ohio State University, Columbus, Ohio). *Vision Research,* vol. 14, Oct. 1974, p. 1047-1049. 15 refs.

Consideration of the convergence effect on perceived size and disparity, and analysis of the effect of 'zoom' on the horopter, i.e., the surface of points having images in the two eyes which yield the impression of identical visual directions. It is shown that restriction of physiological 'zoom' to the phylogenetically older, decussated visual pathways is an important concession to binocularity. Inherent in this view is the implication that there is a functional dichotomy between the projections from the nasal and temporal retinal halves. Only the nasal projections would appear to be ultimately responsible for perception of direction in binocular vision. M.V.E.

A74-46195 **Biological interaction between radiofrequency electromagnetic waves and ionizing radiation.** B. I. Davydov, V. V. Antipov, and V. S. Tikhonchuk. *(Kosmicheskie Issledovaniia,* vol. 12, Jan.-Feb. 1974, p. 129-133.) *Cosmic Research,* vol. 12, no. 1, July 1974, p. 114-117. 17 refs. Translation.

A74-46204 **Vestibular and saccadic influences on dorsal and ventral nuclei of the lateral geniculate body.** M. Magnin, M. Jeannerod, and P. Putkonen (Laboratoire de Neuropsychologie Expérimentale, Bron, France). *Experimental Brain Research,* vol. 21, Sept. 30, 1974, p. 1-18. 66 refs. Research supported by the Institut National de la Santé et de la Recherche Médicale and Université Claude Bernard.

A74-46205 **An intracellular study of neuronal organization in the visual cortex.** K. Toyama, T. Ohno, S. Tokashiki (N.H.K. Broadcasting Science; Tokyo, University, Tokyo, Japan), and K. Matsunami (N.H.K. Broadcasting Science; Tokyo, University, Tokyo; Kyoto University, Inuyama, Aichi, Japan). *Experimental Brain Research,* vol. 21, Sept. 30, 1974, p. 45-66. 45 refs.

A74-46206 **Projection of the vestibular nerve to the area 3a arm field in the squirrel monkey /Saimiri sciureus/.** L. M. Odkvist, D. W. F. Schwarz, J. M. Fredrickson (Toronto, University, Toronto, Canada), and R. Hassler. *Experimental Brain Research,* vol. 21, Sept. 30, 1974, p. 97-105. 34 refs. Medical Research Council of Canada Grant No. MA-3311.

Experiments were performed on six squirrel monkeys under deep pentobarbital anesthesia. Electrical stimulation of the vestibular nerve was employed to evoke primary cortical field potentials. The results obtained in the experiments demonstrate the existence of a vestibular cortical projection to area 3a. The short latencies and the fact that this potential can be evoked under deep Nembutal anesthesia implies a short oligosynaptic pathway. The classification of this projection zone as a primary vestibular field appears, therefore, justified. G.R.

A74-46207 Special aspects of firing rates and thermosensitivity of preoptic neurons. R. Jahns and J. Werner (Ruhr-Universität, Bochum, West Germany). *Experimental Brain Research,* vol. 21, Sept. 30, 1974, p. 107-112. 9 refs.

The study reported is concerned with the reactions of hypothalamic neurons in response to central thermal stimulation. The experiments were conducted with 71 urethane-anesthetized rats. Recordings were made from about 600 neurons of the preoptic area of the hypothalamus. Warm-sensitive and cold-sensitive cells were observed. A neuronal reaction caused by temperature alterations is shown in a graph. Certain effects indicate that the concept of a steady state relation of the mean firing rate to temperature does not always provide an adequate description of the observed phenomena. G.R.

A74-46231 # Effects of ionizing radiation on the ionic permeability of mitochondrial membranes (Deistvie ioniziruiushchei radiatsii na ionnuiu pronitsaemost' mitokhondrial'nykh membran). B. I. Medvedev, Iu. V. Evtodienko, and A. M. Kuzin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino-on-Oka, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 217, July 11, 1974, p. 468, 469. 6 refs. In Russian.

A74-46232 # The nature of the dose rate effect in the gamma irradiation of proteins (O prirode effekta moshchnosti dozy pri gamma-obluchenii belkov). L. I. Kharchenko, T. E. Pavlovskaia, and V. A. Nesterov (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 217, July 11, 1974, p. 481-484. 12 refs. In Russian.

A74-46233 # Complete restructuring of the detection properties of optic cortex neurons in cats, depending on adaptation conditions (Polnaia perestroika detektornykh svoistv neironov zritel'noi kory koshki v zavisimosti ot uslovii adaptatsii). I. A. Shevelev, N. N. Verderevskaia, and V. G. Marchenko (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 217, July 11, 1974, p. 493-496. 15 refs. In Russian.

A74-46321 Loss of weight through complete fasting by members of the armed forces (Gewichtsreduktion bei Bundeswehrangehörigen durch Nulldiät-Behandlung). C. Empter (Bundeswehrkrankenhaus, Kempten, West Germany). *Wehrmedizinische Monatsschrift,* vol. 18, Sept. 1974, p. 268-276. 34 refs. In German.

The causes and dangers of overweight, a problem which is becoming increasingly apparent in the armed forces, are discussed, and the possibilities for weight reduction are indicated. The success achieved in 50 persons treated by complete fasting at the Kempten Military Hospital can be regarded as absolutely satisfactory. Total fasting is regarded as a particularly suitable method of weight reduction for the armed forces. Complete fasting, carried out in hospital under medical supervision is fully without danger, the course of treatment can be varied at will, and considerable losses in weight can be achieved in a relatively short time. The most effective duration of treatment (fasting time) according to the information obtained is about 14 days. A latent diabetes mellitus, which is very frequently present in adiposity, can be favorably influenced by complete fasting and can usually be made to disappear. (Author)

A74-46325 The coordination of eye-head movements. E. Bizzi (MIT, Cambridge, Mass.). *Scientific American,* vol. 231, Oct. 1974, p. 100-106.

An investigation is conducted of the spatial and temporal characteristics of the motor programs underlying the orderly sequence of eye and head movements in monkeys. It is shown how reflex sensory feedback, generated by the turning of the head, interacts with the centrally initiated programs and thereby gives rise to 'coordinated' eye-head movements. Attention is given to the eye and head movements which follow the unexpected presentation of a visual target. The coordinated eye-head response to the sudden appearance of a target is shown in five superposed tracings. The control scheme for eye-head coordination is believed to begin with a central-nervous-system motor program which initiates the movement of the eyes and head when a visual target appears unexpectedly. G.R.

A74-46404 Man at high sustained +Gz acceleration - A review. R. R. Burton, S. D. Leverett, Jr., and E. D. Michaelson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1115-1136. 50 refs.

The physiology and pathophysiology of +Gz exposure of man to 6 G and above for periods longer than 15 sec - termed high sustained G (HSG) - are considered in some detail. The increase in G tolerance afforded by several mechanical aids and/or conscious physiologic-based countermeasures is discussed, and the relative literature is reviewed. The principal limitations of human tolerance to HSG appear to be the occurrence of blackout or fatigue. (Author)

A74-46405 Health surveillance of personnel occupationally exposed to microwaves. I - Theoretical considerations and practical aspects. P. Czerski, M. Siekierzynski, and A. Gidynski (Ministerstwo Zdrowia i Opieki Spolecznej; Wojskowa Akademia Medyczna; Military Institute of Hygiene and Epidemiology, Warsaw, Poland). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1137-1142. 15 refs.

A74-46406 Health surveillance of personnel occupationally exposed to microwaves. II - Functional disturbances. M. Siekierzynski, P. Czerski, H. Milczarek, A. Gidynski, C. Czarnecki, E. Dziuk, and W. Jedrzejczak (Wojskowa Akademia Medyczna; Ministerstwo Zdrowia i Opieki Spolecznej; Military Institute of Hygiene and Epidemiology, Warsaw, Poland). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1143-1145.

A74-46407 Health surveillance of personnel occupationally exposed to microwaves. III - Lens translucency. M. Siekierzynski, P. Czerski, A. Gidynski, S. Zydecki, C. Czarnecki, E. Dziuk, and W. Jedrzejczak (Wojskowa Akademia Medyczna; Ministerstwo Zdrowia i Opieki Spolecznej; Military Institute of Hygiene and Epidemiology, Warsaw, Poland). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1146-1148. 8 refs.

A74-46408 Psychobiologic aspects of double-crew long-duration missions in C-5 aircraft. B. O. Hartman, H. B. Hale, D. A. Harris, and J. F. Sanford, III (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1149-1154. 28 refs.

Subjective fatigue and oral temperature were used as biomedical indices in a study in which two C-5 jet transport crews alternately operated the aircraft. Data collected at 4-hr intervals during and following four 66-hr missions clearly established that these dissimilar functions were rhythmic and flight factors exerted modifying influence on both rhythms. Particularly significant was the finding that subjective fatigue on the average showed initial latency, an intensification phase, and a reversal phase. The last phase apparently represents a state in which there is endocrinemetabolic and sympathetic nervous system hyperactivity (compensation). Oral temperature and subjective fatigue responses to prolonged flight tended to run parallel courses. Recovery rates for subjective fatigue and oral

temperature tended to be similar, and at least 3 days were needed for elimination of residual flight effects. (Author)

A74-46409 Effects of chronic exposure to 3% CO2 on zinc metabolism. C. L. Giannetta and H. R. Crookshank (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1155-1158. 23 refs.

The effect of 3% CO2 exposure on zinc balance of human subjects was studied. Four male volunteers were studied over a 56 day period, divided into a control period of 14 days, an experimental period of 28 days, and a post-experimental recovery period of 14 days. During the duration of the study, urine, feces and serum samples were collected and mineral analyses were conducted. During hypercapnia there is an increase of 5 microg/100 ml in serum zinc level and a decrease of 16.2 microg/100 ml of urinary zinc level. This seems to indicate that the body has an apparent tendency to retain zinc. The variation in zinc balance is transient and tends to return to normal once the stress is removed. An increase of urinary calcium with no apparent change in serum level also was noted during the experimental period. Urinary inorganic phosphorus had a corresponding increase during this period. (Author)

A74-46410 Metabolic and endocrine changes in aerobatic flight. E. J. Pinter (Reddy Memorial Hospital; McGill University, Montreal, Canada). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1159-1163. 14 refs.

Endocrine and metabolic changes were studied in eight healthy volunteers anticipating and executing a pre-arranged sequence of aerobatic flight (exposure to G forces of +2.8 to +5.5, -1.0 to -1.8). Control measurements were made at complete physical and mental rest. Blood and urine sampling was made for 60 min prior to flight, at the end of a 60-min flight, and during a 120-min post-flight period. The following were measured: blood glucose, cholesterol, triglyceride, plasma free fatty acids (FFA), serum thyroxin (T4), corticosteroids, prolactin, growth hormone, immunoreactive insulin, and urinary vanilmandelic acid (VMA) excretion. The pattern of response was uniform in all subjects. Significant changes were seen in plasma FFA, corticosteroids, growth hormone and immunoreactive insulin following aerobatic flight. Anticipation of flight induced significant directional changes in plasma FFA, corticosteroids, as well as VMA excretion. (Author)

A74-46411 * Effects of N2O narcosis on the contraction and repayment of an oxygen debt. C. L. Schatte, P. Hall, J. W. Fitch, and J. E. Loader (Colorado State University, Fort Collins, Colo.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1164-1166. 14 refs. Grant No. NGR-06-002-075.

The oxygen deficit, oxygen debt, and the difference between them were measured in five male and three female subjects during and after exercise while breathing either air or a normoxic mixture containing 33% N2O and nitrogen. With the exception of a higher respiratory quotient at rest in N2O, there were no statistically significant differences for oxygen consumption, carbon dioxide production, expired gas volume, heart rate or blood lactate while breathing N2O during rest, exercise, or recovery. An appreciably, but not statistically, greater mean oxygen deficit was found in N2O along with a significantly greater mean oxygen debt; deficit-debt difference was unaffected by N2O. It was speculated that N2O narcosis did not affect the ability to utilize oxygen but that the response to the greater oxygen need of exercise may have been slowed with perhaps a concomitant greater depletion of stored high energy compounds. (Author)

A74-46412 USAFAM cardiovascular disease followup study - Comparisons of serum lipid and lipoprotein levels. D. A. Clark, M. F. Allen, and F. H. Wilson, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1167-1170. 21 refs.

Would a patient who has an elevated cholesterol level as a middle-aged individual also have had an elevated cholesterol level as a young man. To obtain evidence to answer that question, lipid levels measured in the USAFSAM Cardiovascular Disease Followup (West Point) Study were used to evaluate the stability of an individual's standing within a group. This evaluation was made by computing between-year rank-order correlation coefficients for body weight and serum lipids and lipoproteins over a 14 to 18-year span of time. Within a 109-member subgroup of the study, among these members with the highest 10% of serum cholesterol and Sf 0-12 levels at mean age 23.5 years, only an occasional subject had a rank 14 years later that differed by as many as 20 ranks from his earlier rank. (Author)

A74-46413 Some behavioral effects of pesticides - Phosdrin and free-operant escape-avoidance behavior in gerbils. H. W. Mertens, M. F. Lewis, and J. A. Steen (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1171-1176. 16 refs.

The need for study of the effects on performance of nonlethal pesticide exposure is based on reports of behavioral difficulties in aerial applicators following organophosphate poisoning. The present study examined the effects of Phosdrin (mevinphos) on the aversive behavior of gerbils. A free-operant escape-avoidance task was used with two levels of aversive shock. Dose-related decrements in avoidance behavior occurred at exposure levels also causing overt somatic signs of poisoning. Escape behavior was affected only at the highest Phosdrin dose administered. These data, and the findings of other studies discussed, reinforce warnings to cropdusters using organophosphate pesticides. Serious deficits in behavior may occur simultaneously with or before the first overt somatic signs of poisoning which are often used by applicators to diagnose significant exposure. (Author)

A74-46414 Effects of diazepam and dimenhydrinate on the resting activity of the vestibular neuron. J. H. Ryu and B. F. McCabe (Iowa, University, Iowa City, Iowa). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1177-1179. 13 refs. Grant No. NIH-NS-06785.

The effect of diazepam and dimenhydrinate on the resting activity of the vestibular neurons in the vestibular nuclei of the cat was studied. Diazepam depresses the resting activity of both the semicircular canal and otolithic neurons effectively, and its effect is either on the vestibular system itself, or on the reticular facilitatory system which has direct connections to the vestibular neurons in the vestibular nuclei. Dimenhydrinate has no effect on the semicircular canal neurons, but it depresses the resting activity of otolithic neurons significantly. The effect of dimenhydrinate on the vestibular system is possibly on the otolith organ or the first-or second-order otolithic neurons. (Author)

A74-46415 Alcohol-induced, performance decrements assessed by two link trainer tasks using experienced pilots. P. H. Henry, T. Q. Davis, E. J. Engelken, J. H. Triebwasser, and M. C. Lancaster (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1180-1189. 16 refs.

A74-46416 Treatment of decompression illness and air embolism with hyperbaric oxygen. G. B. Hart (U. S. Naval Regional Medical Center, Long Beach; California, University, Irvine, Calif.). *Aerospace Medicine,* vol. 45, Oct. 1974, p. 1190-1193. 17 refs.

Thirty patients were treated for air embolism: 18 from diving accidents, 11 from iatrogenic sources, and one from criminal means. A death occurred in the iatrogenic group and one in the criminal group. Four patients had permanent neurological deficit. Fourteen patients were treated for decompression illness with no failures. All patients were treated in a monoplace chamber compressed with oxygen and breathing oxygen. (Author)

A74-46445 **Apollo - Achievement and progress also for medical science (Apollo - Erfolg und Fortschritt auch für die Medizin).** H. S. Fuchs (Bundeswehr, Sanitätsamt, Bonn, West Germany). *(Hermann-Oberth-Gesellschaft, Raumfahrtkongress, 23rd, Salzburg, Austria, June 25-29, 1974.) Astronautik,* vol. 11, no. 3, 1974, p. 77-83. In German.

The conduction of the Apollo space flights and the landing of the astronauts on the lunar surface represented a great challenge for the medical science because these operations made it necessary for human beings to live and function in an environment which is very different from the environment of man on earth. The problems which had to be solved to provide the astronauts with the necessary equipment and suitable environmental conditions in spacecraft and spacesuit are discussed, giving attention to the effects produced by the absence of gravity, extravehicular activity, and the spacecraft atmosphere. In solving these problems advances were made in almost all areas of medicine, including in particular medical technology. Details concerning these advances are discussed, giving attention to possible applications of the new approaches and devices in general medical practice on earth. G.R.

A74-46475 **V. V. Parin selected works. Volume 1 - Normal and pathological blood circulation (V. V. Parin izbrannye trudy. Volume 1 - Krovoobrashchenie v norme i patologii).** Edited by V. N. Chernigovskii. Moscow, Izdatel'stvo Nauka, 1974. 345 p. 594 refs. In Russian.

The present work gathers together studies on the physiology and pathology of pulmonary blood circulation, coronary blood circulation, and the adaptation of the heart to large loads. Some of the topics covered include: the heart and physical labor, the contraction mechanism of the spleen during stimulation of sensitive nerves, myocardial stress and the functional reserve of the heart, arrhythmia, the role of calcium in muscular contraction, the role of the pulmonary vessels in the reflex control of blood circulation, coronary blood circulation and coronary insufficiency, and the pulmonary-coronary reflex. P.T.H.

A74-46512 # **Selection of objects according to velocity and direction of motion by electronic simulation methods (Selektsiia ob'ektov po skorosti i napravleniiu dvizheniia metodami elektronnogo modelirovaniia).** A. I. Odinets. *Radioelektronika,* vol. 17, July 1974, p. 88-93. 7 refs. In Russian.

The operating principles of an electronic 'retina' which can select the images of objects according to either their velocity or direction are described. The device is based on the differentiation of signals leaving the receptors (photodiodes). Similar models can be used for preprocessing of optical information. P.T.H.

A74-46543 # **Automata and intelligent behavior: Modeling experience (Avtomaty i razumnoe povedenie: Opyt modelirovaniia).** N. M. Amosov, A. M. Kasatkin, L. M. Kasatkina, and S. A. Talaev. Kiev, Izdatel'stvo Naukova Dumka, 1973. 374 p. 82 refs. In Russian.

The present work expounds the principles of heuristic methods in the problem of artificial intelligence. The problem of automation of intelligent behavior and activity, with man as the original model, is posed, and the basic approaches to the creation of models of intelligent behavior are described. The nature and design of M-automata are discussed, and analogies between processes in an M-network and psychic processes are drawn. Also, motor behavior is discussed as an object for modeling. Experiments with several M-automata are described, and the adaptive behavior of M-automata, including elementary learning processes, is investigated. P.T.H.

A74-46551 **Study of human visual activity (Issledovanie zritel'noi deiatel'nosti cheloveka).** Edited by Iu. B. Gippenreiter. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973. 180 p. In Russian.

The present work gathers together studies devoted to the investigation of the relation of visual activity and eye movements to perception and other processes. Special emphasis is placed on fixation optokinetic nystagmus, its research and use as a parameter in studies of perception and related processes. Some of the topics covered include: fixation optokinetic nystagmus and its mechanisms, study of eye tracking of a self-guided target, visual and motor aspects of eye movements in problems of manual tracking, and an experimental study of the conditions for the transition of tracking movements of the eye to low levels of control.

P.T.H.

A74-46552 # **Eye movements in human activity and in its study (Dvizheniia glaz v deiatel'nosti cheloveka i v ee issledovanii).** Iu. B. Gippenreiter. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 3-25. 37 refs. In Russian.

Some preliminary notions concerning eye movement research are briefly set forth. Two types of investigations are discerned: one where eye movements themselves are the object of study, and the other where the analysis of eye movements is used as a method of studying other processes. The concepts of stimulation, visual mechanism, and problem are defined as being the fundamental factors in a study of eye movements. Finally, the development of the study of fixation optokinetic nystagmus is traced. P.T.H.

A74-46553 # **Fixation optokinetic nystagmus /FOKN/ and its mechanisms (Fiksatsionnyi optokineticheskii nistagm /FOKN/ i ego mekhanizmy).** Iu. B. Gippenreiter and V. Ia. Romanov. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 26-41. 22 refs. In Russian.

Experiments are described and evaluated in which a subject's eye movements were recorded as he fixed on a stationary point against a moving background. These involuntary eye movements constitute fixation optokinetic nystagmus (FOKN). The characteristics of FOKN depend on the relation between the direction of the asymmetry of physiological nystagmus and the direction of the moving background. When these directions are the same, FOKN has the form of stimulated physiological nystagmus; when the directions are opposite, it has the form of suppressed physiological nystagmus. Results reveal the subcortical nature of FOKN. P.T.H.

A74-46554 # **Study of the characteristics of the visual perspective process by the FOKN method (Issledovanie svoistv zritel'nogo pertseptivnogo protsessa metodom FOKN).** V. Ia. Romanov. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 42-68. 58 refs. In Russian.

Experiments were performed to determine whether the various characteristics of the visual process are reflected in fixation optokinetic nystagmus (FOKN). Subjects were to solve various classical visual perspective problems while their FOKN were recorded. Investigations showed that FOKN is one of the subtlest indicators of the tonic system of the eyes. P.T.H.

A74-46555 # **Fixated optokinetic nystagmus as an indicator of the role of vision in movements (Fiksatsionnyi optokineticheskii nistagm kak pokazatel' uchastiia zreniia v dvizheniiakh).** Iu. B. Gippenreiter and G. L. Pil. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 69-83. 6 refs. In Russian.

A74-46556 # **Experimental study of the transition of ocular tracking motions to the lower regulatory levels (Eksperimental'noe issledovanie uslovii perekhoda slediashchikh dvizhenii glaz na nizkie urovni reguliatsii).** S. D. Smirnov. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 94-110. 6 refs. In Russian.

A74-46557 # **Some characteristics of eye tracking of a self-guided target (O nekotorykh osobennostiakh glaznogo slezheniia za samoupravliaemoi tsel'iu).** T. M. Buiakas and Iu. B. Gippenreiter. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 111-125. 8 refs. In Russian.

Analysis of the function of the motor system of the eyes when a visual target was controlled by the hand showed that eye tracking is aided by hand movement when this movement is ordered at a sufficiently low level. Eye movements in this case can receive additional information in the form of a copy of the effector commands to the hand. The motor systems of the hand and eyes then form a kind of synergy. P.T.H.

A74-46558 # **Visual and motor aspects of eye functioning in manual tracking problems (Zritel'nye i dvigatel'nye aspekty raboty glaza v zadachakh ruchnogo slezhaniia).** T. M. Buiakas. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 126-142. 19 refs. In Russian.

A74-46559 # **Perception of the motion of a signal in a manual tracking problem (O vospriiatii dvizheniia signala v zadache ruchnogo slezheniia).** V. V. Liubimov. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 143-152. 9 refs. In Russian.

An experiment is described in which a subject was to track a moving target with a mark whose position he could change by remote control with his hand. The moving target itself was moving against a shifting background. Tracking performance and eye movements were recorded. In effect, the subject had to be constantly evaluating the velocity of the moving target. Several hypotheses are discussed for the observed erratic velocity estimation of the subject. P.T.H.

A74-46560 # **Visual activity of the observer during the detection of a threshold signal (Zritel'naia deiatel'nost' nabliudatelia pri obnaruzhenii porogovogo signala).** L. V. Borozdina. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 153-166. 31 refs. In Russian.

A74-46561 # **Eye motion during the perception of stochastic images (O dvizhenii glaz pri vospriiatii stokhasticheskikh izobrazhenii).** I. K. Ivanov, S. D. Smirnov, and I. I. Tsukkerman. In: Study of human visual activity. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1973, p. 167-180. 8 refs. In Russian.

A74-46627 # **Chronic hypoxia - Adaptive reactions of organisms (Khronicheskaia gipoksiia - Prisposobitel'nye reaktsii organizma).** V. I. Voitkevich. Leningrad, Izdatel'stvo Nauka, 1973. 192 p. 757 refs. In Russian.

Study of some physiological adaptive (protective) reactions of human and animal organisms under conditions of chronic oxygen deficiency. Various forms of protective reactions against hypoxia are described, and their development is traced not only in individuals living under actual conditions of hypoxia, but also in their descendants. The persistence of these reactions after removal of the hypoxia conditions is studied. Results of experiments performed on 13 generations of animals who lived their whole lives under conditions of hypoxia are presented. This includes data on changes in the oxygen-bonding properties of hemoglobin, in the blood supply of the brain, in hematopoiesis, and in the erythropoietic activity of blood serum. Data are also presented on the effect of degree of hypoxia and adaptive training for it on the formation of humoral stimulators of erythropoiesis. P.T.H.

A74-46673 # **The state of weightlessness and protective measures (Beztezinsko stanje i mere zastite).** R. Debiljadji (Institut za Vazduhoplovnu Medicinu, Zemun, Yugoslavia). In: Yugoslav Aerocosmonautics Conference, 1st, Belgrade, Yugoslavia, May 19, 20, 1973, Communications. Number 1 Belgrade, Jugoslovensko Aerokosmonauticko Drustvo, 1973, p. 43-52. In Serbo-Croatian.

Study of the changes induced in the human organism as a result of prolonged stay in the state of weightlessness during space flight. These changes, which are particularly noticeable after the return of the astronaut to gravity conditions, are of reversible nature. In order to prevent deconditioning of the organism under conditions of weightlessness, various protective measures are envisioned to facilitate the readaptation of the organism to gravitational force after returning to earth. A.B.K.

A74-46680 # **The development of active anthropomorphic exoskeletons (Razvoj aktivnih antropomorfnih egzoskeleta).** D. Hristic, M. Vukobratovic, and Z. Stojiljkovic (Institut za Automatizaciju i Telekomunikaciju, Belgrade, Yugoslavia). In: Yugoslav Aerocosmonautics Conference, 1st, Belgrade, Yugoslavia, May 19, 20, 1973, Communications. Number 1. Belgrade, Jugoslovensko Aerokosmonauticko Drustvo, 1973, p. 125-140. 14 refs. In Serbo-Croatian.

Active anthropomorphic exoskeletons are driving structures which are mounted on human beings in order to power basic muscular activities, either in the case of healthy or diseased persons. The present work traces the development of the first machines of this kind, which were designed for the purpose of artificial locomotion. P.T.H.

A74-46686 # **Some aspects of the behavior of the cardiovascular system of astronauts under conditions of weightlessness (Neki podaci o ponasanju kardiovaskularnog sistema kosmonauta u bestezinskom stanju).** R. Podjanin (Savezna Uprava za Civilnu Vazdusnu Plovidbu, Belgrade, Yugoslavia). In: Yugoslav Aerocosmonautics Conference, 1st, Belgrade, Yugoslavia, May 19, 20, 1973, Communications. Number 1. Belgrade, Jugoslovensko Aerokosmonauticko Drustvo, 1973, p. 189-195. In Serbo-Croatian.

The cardiovascular system is closely related to all the functions of the organism. Some individual differences exist in the effects produced by weightlessness in the cardiovascular system of an astronaut. Details of system adaptation to weightlessness conditions vary also in individual cases. The study of the various parameters of the circulatory system requires theoretical and experimental investigations under suitable conditions. G.R.

A74-46694 # **Development of synergic rate control of manipulators (Razvoj sinergiskog brzinskog upravljanja manipulatorima).** M. Gavrilovic and M. Maric (Institut za Automatizaciju i Telekomunikaciju, Belgrade, Yugoslavia). In: Yugoslav Aerocosmonautics Conference, 1st, Belgrade, Yugoslavia, May 19, 20, 1973, Communications. Number 2. Belgrade, Jugoslovensko Aerokosmonauticko Drustvo, 1973, p. 71-87. 14 refs. In Serbo-Croatian.

Application of the concept of synergic rate control to the problem of nonmanual control of a family of elementary movements of obvious functionality. A control structure is proposed in which the control level is maintained by global angular velocity controllers, while the synergic level is maintained by a sequence-of-motions selector and a coordinate-converter unit. In addition, the synthesis of a new family of functional movements is described, and the most important computational aspects of their synthesis are considered. Finally, the results of an experimental evaluation using a computer-manipulator complex are presented. A.B.K.

A74-46699 # **The problem of equilibrium in the weightless state (Problem ravnoteze u bestezinskom stanju).** M. Simonovic (Otorinolaringoloska Klinika, Belgrade, Yugoslavia) and J. Simonovic (Beograd, Univerzitet, Belgrade, Yugoslavia). In: Yugoslav Aerocosmonautics Conference, 1st, Belgrade, Yugoslavia, May 19, 20, 1973, Communications. Number 2. Belgrade, Jugoslovensko Aerokosmonauticko Drustvo, 1973, p. 129-139. 12 refs. In Serbo-Croatian.

Study of the effect of weightlessness on the functioning of the vestibular apparatus of the inner ear. It is shown that the absence of gravity, especially in combination with other accelerations, can lead to a number of vegetative and psychic disturbances in astronauts, since the organ of balance of the inner ear requires the presence of gravity as a stimulus to its proper functioning. In particular, the so-called 'space' sickness can occur. A.B.K.

A74-46707 # **Dynamics and control of anthropomorphic active mechanisms (Dinamika i upravljanje antropomorfnih aktivnih mehanizama).** M. Vukobratovic, D. Juricic, and D. Hristic (Institut za Automatizaciju i Telekomunikaciju, Belgrade, Yugoslavia). In: Yugoslav Aerocosmonautics Conference, 1st, Belgrade, Yugoslavia, May 19, 20, 1973, Communications. Number 2. Belgrade, Jugoslovensko Aerokosmonauticko Drustvo, 1973, p. 235-251. 9 refs. In Serbo-Croatian.

The basic features of a new control concept are discussed, which may be used for synthesizing artificial specifically anthropomorphic biped walk. Reduction in system dimensionality is achieved by breaking down the control hierarchy into a nominal dynamics level and a level of perturbed modes. For demonstration the concept is applied to the synthesis of an active exoskeleton-type biped walking robot. V.P.

STAR ENTRIES

N74-33527*# Delaware State Coll., Dover. Dept. of Biology.
THE RAPID QUANTITATION OF THE FILAMENTOUS BLUE-GREEN ALGA PLECTONEMA BORYANUM BY THE LUCIFERASE ASSAY FOR ATP
Valerie N. Bush Mar. 1974 20 p refs
(Grant NGR-08-002-003)
(NASA-CR-140486) Avail: NTIS HC $4.00 CSCL 06C

Plectonema boryanum is a filamentous blue green alga. Blue green algae have a procaryotic cellular organization similar to bacteria, but are usually obligate photoautotrophs, obtaining their carbon and energy from photosynthetic mechanism similar to higher plants. This research deals with a comparison of three methods of quantitating filamentous populations: microscopic cell counts, the luciferase assay for ATP and optical density measurements. Author

N74-33528*# Colorado State Univ., Fort Collins.
[RESEARCH ON INERT GAS NARCOSIS AND AIR VELOCITY EFFECTS ON METABOLIC PERFORMANCE] Semiannual Status Report, Nov. 1973 - 30 Apr. 1974
30 Apr. 1974 61 p refs
(Grant NGR-06-002-075)
(NASA-CR-140065) Avail: NTIS HC $6.25 CSCL 06P

The effects of air velocity on metabolic performance are studied by using high forced airflow in a closed environment as a mechanism to control the concentration of volatile animal wastes. Air velocities between 100 and 200 ft/min are without significant effects on the metabolism of rats. At velocities of 200 ft/min and above, oxygen consumption and CO2 production as well as food consumption increase. In most instances, the changes are on the order of 5-10%. At the same time, the RQ for the animals increases slightly and generally correlates well with oxygen consumption and CO2 production. Experiments on the nature of inert gas narcosis show that halothane and methoxyflurane are rather potent inhibitors of the NADH:O2 oxidoreductase system in rats. These experiments suggest that the mechanism of inert gas narcosis is not mandatorily related to a membrane surface phenomenon. Author

N74-33529*# Grambling Coll., La. Dept. of Physics.
THE EFFECT OF CONTINUOUS LOW DOSE-RATE GAMMA IRRADIATION ON CELL POPULATION KINETICS OF LYMPHOID TISSUE Final Report
Bessie R. Foster 4 Oct. 1974 35 p refs
(Grant NGR-19-011-008)
(NASA-CR-140114) Avail: NTIS HC $4.75 CSCL 06R

Cellular response and cell population kinetics were studied during lymphopoiesis in the thymus of the mouse under continuous gamma irradiation using autoradiographic techniques and specific labeling with tritiated thymidine. On the basis of tissue weights, it is concluded that the response of both the thymus and spleen to continuous low dose-rate irradiation is multiphasic. That is, alternating periods of steady state growth, followed by collapse, which in turn is followed by another period of homeostasis. Since there are two populations of lymphocytes - short lived and long-lived, it may be that different phases of steady state growth are mediated by different lymphocytes. The spleen is affected to a greater extent with shorter periods of steady-state growth than exhibited by the thymus. Author

N74-33530*# Pennsylvania Univ., Philadelphia. Dept. of Biology.
RESEARCH ON GRAVITATIONAL PHYSIOLOGY Technical Status Report, 1 Mar. - 31 Aug. 1974
Allan H. Brown and A. Orville Dahl 31 Aug. 1974 20 p refs
(Grants NGR-39-010-149)
(NASA-CR-139691) Avail: NTIS HC $4.00 CSCL 06C

The topic of gravitational plant physiology was studied through aspects of plant development (in ARABIDOPSIS) and of behavior (in HELIANTHUS) as these were affected by altered g experience. The effect of increased g levels on stem polarity (in COLEUS) was also examined. Author

N74-33531*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROCEEDINGS OF THE 1972 LYNDON B. JOHNSON SPACE CENTER ENDOCRINE PROGRAM CONFERENCE
Sep. 1974 113 p refs Conf. held at Houston, Tex., Nov. 1972
(NASA-TM-X-58134; JSC-09046) Avail: NTIS HC $4.50 CSCL 06P

Subjects covered during the Endocrine Program Conference include the following: (1) endocrine/metabolic studies on the Apollo 16 crewmen; (2) changes in glucose, insulin, and growth hormone levels associated with bed rest; (3) circadian rhythms of heart rate and body temperature during 56 days of bed rest; (4) stress-induced changes in corticosteroid metabolism in man; (5) present status of physiological studies on parathyroid hormone and vitamin D; (6) antagonistic effect of lithium on antidiuretic hormone action; (7) proposed Skylab body-fluid volumes study; (8) daily rhythmic changes in serotonin content in areas of the mouse brain and norepinephrine content in areas of the hamster brain; (9) studies of sodium homeostasis during simulated weightlessness; and (10) application of the water immersion model to man. Author

N74-33532*# Kanner (Leo) Associates, Redwood City, Calif.
CEREBRAL BLOOD CIRCULATION INVESTIGATIONS ABOARD SOYUZ 13 -- SALYUT 3
I. Kasyan and Kh. Asanov Washington NASA Sep. 1974 5 p Transl. into ENGLISH from Med. Gaz. (USSR), 2 Aug. 1974 p 3
(Contract NASw-2481)
(NASA-TT-F-15987) Avail: NTIS HC $4.00 CSCL 06S

Studies conducted during the Soyuz 13 flight dealing with cerebral blood flow in crew members F. Popovich and Yu. Artyukhin aboard the Salyut 3 space station are described. A Levkoy two channel rheoplethysmograph was used to record and transmit rheograms and electroplethysmograms to earth through the spacecraft's telemetric system. Author

N74-33533*# Kanner (Leo) Associates, Redwood City, Calif.
BIOLOGICAL RESEARCH IN SPACE: SOME CONCLUSIONS AND PROSPECTS
O. G. Gazenko, Ye. A. Ilin, and G. P. Parfenov Washington NASA Sep. 1974 29 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (USSR), no. 4, Jul. - Aug. 1974 p 461-475
(Contract NASw-2481)
(NASA-TT-F-15961) Avail: NTIS HC $4.50 CSCL 06C

The main Soviet biomedical experiments conducted since the beginning of space flight are reviewed; on the basic of their results, it is concluded that prolonged manned space flight is possible, although certain apparently reversible changes in vital processes have been noted. The experiments are divided into four groups: research on mammals and turtles, on insects and amphibians, on plants, and on microorganisms and tissue cultures. In these experiments, the genetic effect of cosmic ionizing radiation and other factors of space environment, and the effect of weightlessness are stressed. Author

N74-33534# Advisory Group for Aerospace Research and Development, Paris (France).
THE PHYSIOLOGY OF COLD WEATHER SURVIVAL
A. Borg, ed. (Roy. Norweg. Air Force) and J. H. Veghte, ed. (AMRL, Wright-Patterson AFB, Ohio) Jun. 1974 99 p refs (AGARD-R-620) Avail: NTIS HC $8.00

Physiological factors and emergency life sustaining measures It is common experience that the discomfort caused by cold is reduced by repeated or prolonged cold exposures. There is also ample evidence that shivering is reduced with repeated cold exposures. These reductions of physiological reactions to cold upon repeated exposures to low ambient temperatures point towards a central nervous habituation as the main mechanism of cold acclimatization in man. Author

N74-33535 Oslo Univ. (Norway).
THERMOGENETIC MECHANISMS INVOLVED IN MAN'S FITNESS TO RESIST COLD EXPOSURE
K. Lange Anderson *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 1-6 refs

The main factor by which man's fitness to resist cold exposure can be varied, appears to be thermogenesis. The biological variation of BMR, shivering, a possible non-shivering thermogenesis, and the maximal aerobic power is reviewed. BMR of an individual can vary with diet, general health, habitual physical activity, as well as various environmental conditions, conceivably including cold exposure. A definite inter- and intra-individual variation in shivering threshold exists. Man's capability to raise his metabolism in muscular exercise is an important part of his fitness to resist cold exposure. This capability can be assessed by measurement of maximal oxygen uptake. Maximal oxygen uptake is influenced by age, sex, health, diet and habitual physical activity. Author

N74-33536 Oslo Univ. (Norway).
PERIPHERAL CIRCULATORY ADJUSTMENT TO COLD
John Krog *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 7-15 refs

Measurements of blood circulation in the hands and faces of Arctic people are compared with those on Norwegian lumberjacks and city dwellers. Obtained data for time of onset of vasodilation, amount of vasodilation, and pressure response following cold stimulation indicate that the greater tolerance to cold in Arctic people is due to an adjustment of the vasomotor control in the pheripheral tissue, in such a way that the initial vasoconstriction response is less severe and lasts shorter. G.G.

N74-33537 Royal Norwegian Air Force, Oslo.
INTRODUCTION TO WINTER SURVIVAL
Rolf A. Grimsrud and Claus Moelbach-Thellessen *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 17-28

In winter man cannot stay in the open and expect to live unless he is on the move. He needs a shelter of some kind even if it is only a hole in the snow. It should be kept in mind that a wind of 10 knots equals a fall in temperature of approximately 30 deg celsius on the skin compared with that experienced in quiet weather. The type of shelter to be built will depend on: (1) tools and material available; (2) snow conditions; and (3) the length of time of expected residence in that particular location. Aircrew must remember to adjust their clothing while working. Sweating should be avoided. Emergency signalling equipment should be readily available at all times and the camp site should be made as conspicuous as possible from the air. Author

N74-33538 Oslo Univ. (Norway).
METHODS IN CIRCULATORY RESEARCH
John Krog *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 29-39

The principles of indirect methods and direct methods for determining human peripheral circulation are discussed in connection with planning for research in aviation medicine. The former are based on body tissue temperature measurements, changes in oxygen tension, and elimination of metabolic inert substances; the latter category includes plethysmography and flow meters. G.G.

N74-33539 Oslo Univ. (Norway). Human Adaptability Section.
LOCAL EFFECTS OF ACCLIMATIZATION TO COLD IN MAN
Bjorn Hellstrom *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 41-51 refs

The mechanisms underlying local manifestations of cold acclimatization are not fully known, but point to a central nervous habituation to cold exposure. This primitive type of learning is characterized by a diminishing response upon repeated stimulation. It is common experience that the discomfort caused by cold is reduced by repeated or prolonged cold exposures. There is also ample evidence that shivering is reduced with repeated cold exposures. These reductions of physiological reactions to cold upon repeated exposures to low ambient temperatures point towards a central nervous habituation as the main mechanism of cold acclimatization in man. Author

N74-33540 Oslo Univ. (Norway). Inst. of Work Physiology.
A PHYSIOLOGICAL COMPARISON OF THE PROTECTIVE VALUE OF NYLON AND WOOL IN A COLD ENVIRONMENT **c05**
Kaare Rodahl, Fredric A. Giere, Peer H. Staff, and Bertil Wedin *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 53-57 refs

Similar inner garments of nylon pile and of wool pile were compared in paired experiments at rest for one hour and during two hours fairly strenuous physical activity (treadmill walking at 100 m/min, 5% incline) followed by two hours rest in a climatic chamber at -20 C. Each subject served as his own control, participating in experiments using both types of experimental garments. Under these conditions no significant difference could be detected between the two types of garments in terms of thermal insulation, nor in the ability of the two types of fabric to allow free escape of moisture produced by sweating during physical activity. Author

N74-33541 Oslo Univ. (Norway). Human Adaptability Section.
VIBRATION INJURIES AND COLD EXPOSURE
Bjorn Hellstrom *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 59-67 refs

The connection between cold exposure and traumatic vasospastic desease is studied on forest workers who experience vasodilation of the fingers even in a very cold climate environment. Experimental results indicate that these workers achieve an acclimatization to cold manifesting itself by a lowered central temperature threshold for cutaneous vasodilation during exercise. Cold is the main trigger of vasospastic attacks. G.G.

N74-33542 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
COLD PHYSIOLOGIC STUDIES
James H. Veghte *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 69-76 refs

A number of research studies are discussed in which human physiological responses to cold have been monitored in evaluation of insulating clothing and protective sheltering. Cold, as a stressor, can be overcome if aircrew members are educated that there is usually sufficient time in a survival situation to meet any cold stress. The importance of extremity protection, danger of CO2 or CO poisoning in snow shelters, and loss of insulation because of moisture accumulation are paramount. Author

N74-33543 Royal Naval Air Medical School, Hillhead (England).
IMMERSION HYPOTHERMIA
F. St. C. Golden *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 77-90 refs

Human thermoregulation in water, and the factors affecting survival times of the immersed victim are discussed in broad detail. The physiological changes encountered in hypothermia are outlined and the associated signs and symptoms discussed. Some general advice on treatment is proposed, both from the first aid and curative standpoint. Author

N74-33544 Royal Naval Air Medical School, Hillhead (England).
AIRCREW SURVIVAL TRAINING IN THE UNITED KINGDOM AND NORTHERN NORWAY c05
W. J. Blake *In* AGARD The Physiol. of Cold Weather Survival Jun. 1974 p 91-93

Details of the basic survival training given to Royal Naval Aircrew in the United Kingdom are reported. The further training given in northern Norway is also covered. Author

N74-33546# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 8, NO. 4, 1974
10 Oct. 1974 151 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 1-88
(JPRS-63175) Avail: NTIS HC $10.75

Long duration space flight effects on the human body and human factors engineering aspects of life support systems are considered.

N74-33547 Joint Publications Research Service, Arlington, Va.
PASSIVE HYPERPOLARIZATION ACCOMPANYING A DEFICIT OF EXCITATION
G. N. Sorokhtin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 1-10 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 3-9

Reactions of various (central and peripheral) excitable structures in response to a lack of excitation are described. Termination of the influx of excitation impulses can be caused by transections, blockades and central inhibition under physiological conditions. In all cases excitable structures in the case of a deficit of excitation exhibit passive hyperpolarization which is accompanied by decreased or increased excitability. During passive hyperpolarization, metabolism is characterized by a decreased intensity of oxidative processes and moderate metabolism rates. Author

N74-33548 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF DISTURBANCES IN MINERAL METABOLISM IN RATS DURING PROLONGED HYPOKINESIA
A. A. Pokrovskiy, R. A. Zavalishina, and A. Menendes *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 11-17 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 10-14

Changes in mineral metabolism of rats exposed to prolonged hypodynamia were studied. Urine electrolyte excretion exhibited three phases. The first two phases were typical of two stages in the stress period. The third phase was characterized by a normal excretion of K and Mg and an increased excretion of Ca and P up to 150-170 percent by the end of the experiment. Balance studies indicated higher losses of Ca and P equilibrium remaining positive. Ca losses during hypodynamia were demonstrated by bone tissue analysis of femoral bones. Experimental rats also exhibited a significant decrease in the hydroxyproline content in the bone tissues. Author

N74-33549 Joint Publications Research Service, Arlington, Va.
SENSITIVITY OF THE ANIMAL BODY TO NARCOTICS DURING RESTRICTED MOTOR ACTIVITY
L. Ya. Kolemeyeva and V. S. Shashkov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 18-26 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 14-19

The influence of restricted motor activity on the sensitivity of the animal body to narcotics, which affect primarily different parts of the central nervous systems, was studied. These drugs are also used for a pharmacological analysis of impairments in physiological functions arising during restricted motor activity. Collected data indicate that animal reactivity to narcotic substances is dependent on the duration of restricted mobility and the spectrum of effect of the investigated drug. Author

N74-33550 Joint Publications Research Service, Arlington, Va.
NEUROSECRETION OF THE HYPOTHALAMUS AND CHANGES IN THE SUPRARENALS IN THE PROCESS OF ADAPTATION TO OXYGEN STARVATION AND DEEP HYPOTHERMIA
N. V. Korostovtseva, V. I. Bertash, and Ye. S. Sergeyeval *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 27-32 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 20-23

Experiments on Wistar rats demonstrated that a single exposure to hypoxic and hypercapnic hypothermia brought about a noticeable increase in the activity of both the central and peripheral parts of the hypothalamic-hypophyseal-suprarenal system. A hypothermal exposure applied two days later under the same conditions, when the animals exhibited an enhanced tolerance to oxygen starvation, induced less marked system responses. It is concluded that the hypothalamic-hypophyseal-suprarenal system plays the major role in the increase of animal tolerance to the above extremal conditions. Author

N74-33551 Joint Publications Research Service, Arlington, Va.
FUNCTIONAL-MORPHOLOGICAL CHANGES ACCOMPANYING INCREASING HYPOXIA AND HYPERCAPNIA
V. L. Popkov, N. G. Lakota, and G. P. Bykov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 33-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 24-28

In experiments with dogs it was possible to simulate three types of failure of systems for regenerating the atmosphere, leading in a manned pressurized volume to slowly increasing hypoxia, hypercapnia and their combination. A comparative description is given of the nature and rate of development of shifts in some indices of the state of the organism and morphological changes in the organs and tissues. A combination of hypercapnia and hypoxia caused earlier and deeper disturbances. Recommendations on the relative critical concentrations of oxygen and carbon dioxide for cases of failure of atmospheric regeneration systems in manned spaces must be based not only on the functional indices, but also on the expected morphological impairments. Author

N74-33552 Joint Publications Research Service, Arlington, Va.
STABILITY OF MULTIPLY COUPLED SYSTEMS WITH A SYMMETRIC STRUCTURE OF A NEUTRAL CONTROLLED OBJECT AND GROUP BEHAVIOR OF SUBJECTS IN A PSYCHOLOGICAL EXPERIMENT
V. K. Vasilyev and A. B. Savvin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 39-46 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 28-33

The asymptotic stability was studied of linear differential equations in Cauchy form, whose matrix is the product of two symmetric matrices. The property of mutual supplementation of the spectra of matrix cofactors for asymptotically stable systems is demonstrated. The results are used in a rough evaluation of algorithms of group behavior of human subjects in experiments formulated using the homeostatic method. Author

N74-33553 Joint Publications Research Service, Arlington, Va.
DETERMINATION OF THE MECHANICAL PARAMETERS OF THE OTOLITHIC APPARATUS AND ITS ANATOMIC CHARACTERISTICS
V. N. Krutko *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 47-54 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 33-38

Expressions have been derived to correlate mechanical parameters of the otolithic system--the time constant and membrane sensitivity to accelerations--and its anatomical characteristics. An equation has been derived to calculate the effect of accelerations on the local foci of the sensory epithelium of the otolithic macula. The sensitivity of the otolithic apparatus is different for different animal species, different sensory surfaces and different acceleration vectors. Author

N74-33554 Joint Publications Research Service, Arlington, Va.
SOME PSYCHOPHYSIOLOGICAL CAUSES OF FLIGHT ACCIDENTS AND MEASURES FOR ENSURING FLIGHT SAFETY IN CIVIL AVIATION
A. V. Chapek *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 55-61 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 39-43

The reasons for flight accidents associated with personality factors of crew members and ground control personnel are discussed. The psychophysiological mechanisms of certain erroneous actions of the pilot and controller in an emergency situation are elaborated and some safety measures are suggested. Author

N74-33555 Joint Publications Research Service, Arlington, Va.
MAN'S PHYSICAL PERFORMANCE AFTER THIRTY-DAY HYPOKINESIA WITH COUNTERMEASURES c05
B. S. Katkovskiy, G. V. Machinskiy, P. S. Toman, V. I. Danilova, and B. F. Demida *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 62-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 43-47

A 30-day bedrest experiment in which healthy test subjects were kept in horizontal and antiorthostatic positions revealed a decline in max VO sub 2 and the total amount of the work done. The performance of the test subjects who were exposed to the antiorthostatic position was lower than that of horizontal subjects. The causes underlying the decline in physical performance and the effect of different preventive measures are discussed. The information level of such physical performance parameters as the amount of work done and max VO sub 2 is discussed. Author

N74-33556 Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF HUMAN GAIT AFTER 30-DAY HYPOKINESIA c05
I. F. Chekirda, A. V. Yeremin, V. I. Stepantsov, and I. P. Borisenkoj *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 69-74 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 48-51

The kinematics and coordination structure of the walking pattern of nine test subjects were analyzed after a 30-day bedrest experiment. A cyclogrammetric procedure helped to reveal characteristic changes in the walking structure induces by bedrest. These changes included a complication of the walking structure, appearance of additional correction signals from the central nervous system, a decrease in the amplitude of waves of spontaneous innervation origin, and an increase in the amplitude of waves of reactive and reactive innervation origin. The test subjects who had trained their walking and running habits in the recumbent position exhibited less marked changes in walking structure in comparison with the controls and with subjects who underwent electric stimulation of the muscles. Author

N74-33557 Joint Publications Research Service, Arlington, Va.
EVALUATION OF THE PROPHYLACTIC EFFECT OF LOWER BODY NEGATIVE PRESSURE (LBNP) DURING A THIRTY-DAY BEDREST REGIME
I. D. Pestov, V. S. Panchenko, and B. F. Asyamolov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 75-80 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 52-55

During a 30-day bedrest experiment the effect of lower body negative pressure (LBNP) applied as a countermeasure and the possibility of detecting orthostatic changes with the aid of a Valsalva maneuver and LBNP test were studied. LBNP used during the last five bedrest days was more effective than LBNP applied daily. The effect of LBNP training was also related to individual characteristics of the test subjects. Cardiovascular responses to the Valsalva maneuver and LBNP test were similar to the responses to the orthostatic test in their pattern and direction. These tests used during the simulation of weightlessness reveal potential orthostatic intolerance of test subjects. Author

N74-33558 Joint Publications Research Service, Arlington, Va.
EXTERNAL METABOLISM OF MINERAL ELEMENTS IN MAN IN A BIOLOGICAL LIFE SUPPORT SYSTEM
M. I. Veber, I. I. Gitelzon, and Yu. N. Okladnikov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 81-87 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 55-60
Avail: NTIS

External metabolism of mineral elements (phosphorus, magnesium, sulphur, potassium, sodium, calcium) in man in a biological life support system has been studied. Whereas the external balance of these elements is satisfactory over a long period of time, their intake and excretion over a short period of time varies greatly. The amplitude of fluctuations in the daily excretion of the elements exceeds the variability of their intake with the food. Author

N74-33559 Joint Publications Research Service, Arlington, Va.
PSYCHONEUROLOGICAL DISTURBANCES IN EXPERIMENTAL SLEEP DEPRIVATION WITH INFORMATION RESTRICTION
O. N. Kuznetsov, L. P. Rozova, V. P. Stupnitskiy, Ye. V. Trufanova, and I. S. Zamaletdinov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 88-96 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 60-66

Behavioral reactions of healthy test subjects in experiments with 64- and 74-hour sleep deprivation were investigated. Test subjects were kept in separate isolation chambers for 10 days. During forced wakefulness they exhibited dysthymic disorders, typical isolation phenomena and states of asomnic disorientation and aspontaneity. The state of asomnic disorientation can be differentiated from the depersonalization and psychic automatism syndromes. In addition to increasing fatigue, biorhythmological mechanisms of alternation of sleep and wakefulness were also involved in the genesis of psychic disorders. The data obtained using personality procedures were analyzed from the point of view of modern pathophysiological concepts. Recommendations are made concerning medical monitoring during spaceflight. Author

N74-33560 Joint Publications Research Service, Arlington, Va.
SOME DATA ON THE LOCALIZATION OF GAS BUBBLES CAUSING HIGH-ALTITUDE DECOMPRESSION PAINS
V. P. Katuntsev and I. P. Poleshchuk *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 97-102 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 66-70

Decompression disease was analyzed in 61 test subjects during 357 altitude chamber ascents to altitudes of 6,000 to 9,500 m. Every 20 minutes the test subjects performed a standardized set of physical exercises. Self-observations of the

subjects contributed to a better understanding of the bends during altitude decompression disease. The effect of occlusion cuffs on the pain level was studied. Physiological investigations suggest that decompression disease is brought about by extravascular gas bubbles located in not readily distensible tissues containing a large number of nerve receptors. Author

N74-33561 Joint Publications Research Service, Arlington, Va.
APPARATUS FOR DYNAMIC GAS MIXING FOR CARRYING OUT EXPERIMENTS AT REDUCED BAROMETRIC PRESSURE
A. N. Molodtsov, A. V. Sedov, and P. Ye. Ronskiy-Slavkin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 103-106 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 70-72

An apparatus developed for dynamic gas mixing was used in biomedical experiments in establishing the maximum admissible concentrations of carbon monoxide and methane for a man wearing individual protective gear and performing heavy physical labor in an atmosphere with reduced barometric pressure. Author

N74-33562 Joint Publications Research Service, Arlington, Va.
CAGE WITH A VARIABLE INTERNAL VOLUME FOR HYPOKINESIA
I. G. Krasnykh, D. N. Gavrilyuk, and V. Ye. Potkin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 107-109 Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 73-74

The effects of prolonged hypokinesia on dogs were studied by positioning the animals in a cage with adjustable movable walls. Thus a cage size was obtained that excluded loads on the animal's support motor apparatus and ensured considerable hypokinesia. G.G.

N74-33563 Joint Publications Research Service, Arlington, Va.
TWO-COORDINATE DEVICE FOR THE READ-OUT OF GRAPHIC INFORMATION
A. M. Zhdanov and V. S. Shirokov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 110-112 Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 74-76

A two-coordinated readout device is reported for the semiautomatic measurement of information parameters of graphic images and their input into electronic computers. The apparatus combines the merits of visual discrimination of informational graphic data from initial graphs and automatic coding of information and its input into an electronic computer. Author

N74-33564 Joint Publications Research Service, Arlington, Va.
ENGINEERING METHOD FOR COMPUTING ILLUMINATION OF THE WORK PLACE OF AN OPERATOR
S. M. Zalkind *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 113-116 ref Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul-Aug. 1974 p 76-78

A nomogram is formulated for determining the required illumination of a working plane for a stipulated level of visibility for different symbols. Using this nomogram it is possible to solve the following problems: (1) determine visibility of a scale symbol with the parameters alpha and k in the range of illuminations 30-140 lux; and (2) determine the necessary illumination for ensuring the normalized value of visibility of a scale symbol with the parameters alpha and k. Author

N74-33565 Joint Publications Research Service, Arlington, Va.
UNIVERSAL NATURE OF THE CHEMICAL BASIS OF LIVING SYSTEMS
L. M. Mukhin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 117-120 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 78-80

A comparison of absolute organogens in the earth's crust, in the universe, and in living matter shows that the chemical composition of living matter is far closer to that of the universe than to the earth' crust. A comparative analysis of the position of carbon and silicon in the scale of poling electro-negatives indicates the improbability of silicon as a basis for the structuring of life. Author

N74-33566 Joint Publications Research Service, Arlington, Va.
EFFECT OF HYPOKINESIA ON SOME INTEGRAL INDICES OF THE BODY CONDITION OF WHITE RATS
N. T. Svistunov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 121-124 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 80-81

In experimental animals prolonged hypokinesia causes a considerable lag in growth and development, a disturbance of metabolic processes, and a decrease in overall resistance and adaptation-compensatory possibilities of the body. Prolonged maintenance of white rats under hypokinetic conditions with retention of the possibility of assuming natural poses and taking care of individual parts of the body causes less significant changes in the bodies of these animals than rigorous hypokinesia conditions. The rapid return of the principal integral indices to the initial levels and the progressive development of the animals after the experiment indicate absence of deep shifts and the maintenance at a high level of the adaptation-compensatory possibilities of the bodies of these experimental animals. Author

N74-33567 Joint Publications Research Service, Arlington, Va.
HUMAN NITROGEN BALANCE ASSOCIATED WITH REDUCED AND INCREASED ENERGY EXPENDITURES
V. V. Polyakov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 125-127 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 82-83

The dynamics of the nitrogen balance are studied for different levels of energy expenditures under conditions of regulated intake of food nitrogen into the human body. A nitrogen level in the ration of 7.98 g/day ensured a stable positive nitrogen balance. A nitrogen content in the diet of 6.79 g/day led by the 20th day to the establishment of a positive nitrogen balance; this indicates an adequate protein supply under hypodynamia conditions. Author

N74-33568 Joint Publications Research Service, Arlington, Va.
EFFECT OF 30-DAY HYPOKINESIA ON BODY REACTIVITY TO DRUGS
V. Ye. Belay and N. N. Uglova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 128-130 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 83-84

Body reaction to a combination of central nervous system stimulants in the course of 30-day hypokinesia was studied. Reaction to drugs was evaluated from change in the ECG, arterial pressure, respiration rate, lung ventilation, oxygen consumption, elimination of carbon dioxide under ordinary conditions and against a background of a carefully measured physical load. Detected quantitative reactivity changes in the reaction to drugs depended on the period of hypokinesia and inidividual peculiarities of adaptation of the principal physiological systems of the body. Author

N74-33569 Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATE OF THE RECEPTOR APPARATUS OF ORGANS OF THE ORAL CAVITY DURING HYPOKINESIA
A. I. Volozhin, V. Yu. Kurlyandskiy, S. M. Budylina, I. D. Pestov, V. A. Khvatova, V. F. Gurina, and I. V. Rosinskaya *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 131-133 refs Transl. into ENGLISH from

Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 85-86

As a result of 30-day hypokinesia there were considerable changes in activity of the human oral cavity receptor apparatus, manifested in an increase in sensitivity of receptors of the supporting tissues of the tooth to a load, a decrease in sensitivity and inadequate perception of taste stimuli, a decrease in the level of mobilization of the taste receptors of the tongue, and an impairment of the gastro-lingual reflex. The tactile sensitivity gradient of the mucous membrane changes and the normal asymmetry of sensitivity to the right and left was smoothed out. Electric stimulation of the muscles during hypokinesia leads to normalization of activity of the oral cavity receptor apparatus. Author

N74-33570 Joint Publications Research Service, Arlington, Va.
MANS MENTAL PERFORMANCE UNDER CONDITIONS OF PROLONGED HYPOKINESIA WITH USE OF LOWER BODY NEGATIVE PRESSURE
K. K. Ioseliani *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 134-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 86-87

The joint effects of hypokinesia and lower body negative pressure on human mental performance were studied under time deficit conditions, complex differentiating activities, and memorization tasks. Results showed an inhibition of mental activity, deterioration of routine memory and attention, and a decrease of mechanical memory. Training with LBNP made possible the retention of a high level of performance under conditions of prolonged hypokinesia. Author

N74-33571 Joint Publications Research Service, Arlington, Va.
REACTION OF DISPROPORTIONATION OF CARBON MONOXIDE AS A STAGE IN THE PHYSICOCHEMICAL PROCESSES OF REGENERATION OF OXYGEN FROM CARBON DIOXIDE
T. N. Pavlova, V. A. Naumov, and A. P. Savin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 4, 1974 (JPRS-63175) 10 Oct. 1974 p 137-139 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (Moscow), v. 8, no. 4, Jul.-Aug. 1974 p 87-88

The catalytic reaction of disproportionation of carbon monoxide is used to determine oxygen regeneration system variants in a physicochemical process where the first stage is the direct decomposition of CO2 into CO and O2. Solid electrolytes plus the Bell reaction are utilized. The most promising catalyst for the Bell reaction is shown to be iron; the efficiency of the process increases considerably when hydrogen is introduced into the reaction mixture. G.G.

N74-33572*# Scientific Translation Service, Santa Barbara, Calif.
MICROBIOLOGICAL FACTORS IN THE MIGRATION OF CERTAIN MINERALS IN SOIL
T. V. Aristovskaya, A. Yu. Daragan, L. V. Zykina, and R. S. Kutozova Washington NASA Oct. 1974 19 p refs Transl. into ENGLISH from Pochvovedenie (Moscow), no. 9, 1969 p 95-104
(Contract NASw-2483)
(NASA-TT-F-15928) Avail: NTIS HC $4.00 CSCL 06M

The basic microbiological processes causing mobilization of chemical elements from poorly soluble compounds are discussed. It is concluded that the most important roles are played by: (1) the formation by microorganisms of mineral and organic acids and products forming complex compounds with mineral elements; (2) the release of biogenetic alkalis; (3) the effect of slimes formed by certain bacteria and algae; and (4) the life processes of microorganism reducing agents. Author

N74-33573*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF CAFFEINE ON BILE AND PANCREATIC JUICE SECRETION
Ch. Vaille, Ch. Debray, J. DeLaTour, Cl. Roze, and M. Souchard Washington NASA Oct. 1974 16 p refs Transl. into ENGLISH from Ann. Pharm. Fr. (France), v. 24, nos. 7-8, 1966 p 515-522
(Contract NASw-2481)
(NASA-TT-F-15978) Avail: NTIS HC $4.00 CSCL 06P

A series of experiments on rats demonstrate that caffeine alone has very little effect on bile secretion, but that it does produce a 100% increase in pancreatic flow, although the protein content of the pancreatic juice does not increase proportionately. Several possible explanations for this effect are offered, but it is not yet possible to draw any definite conclusions. Author

N74-33574*# Kanner (Leo) Associates, Redwood City, Calif.
MODELING OF A COMPLEX OF SYSTEMS OF THE ORGANISM WHICH ARE ASSOCIATED WITH BLOOD CIRCULATION AND CARRYING OUT OF PHYSIOLOGICAL EXPERIMENTS WITH THIS COMPLEX
L. A. Dartau Washington NASA Oct. 1974 15 p refs Transl. into ENGLISH from the book "Optimizatsiya Issledovaniye Operatsii. Bionika" Moscow, Nauka Press, 1973 p 229-235
(Contract NASw-2481)
(NASA-TT-F-15972) Avail: NTIS HC $4.00 CSCL 06P

A computer model of a complex of systems associated with blood circulation is discussed and illustrated with a diagram. Modeling and physiological tests are discussed, data are presented and comparisons of modeling and physiological tests are presented, for forced hypo- and hyperventilation, administration of arfonad and isolated perfusion of the carotid sinus. A model experiment in regulation of an artificial heart is described and discussed, with a comparison of four control algorithms. Author

N74-33575*# Minnesota Univ., Minneapolis. Div. of Environmental Health.
PROJECT ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE Progress Report, 1 Dec. 1973 - 29 May 1974
Irving J. Pflug 29 May 1974 15 p refs
(Grant NGL-24-005-160)
(NASA-CR-140447; SAPR-12) Avail: NTIS HC $4.00 CSCL 06M

Microbiological analyses of soil particles allow for the following conclusions: (1) there is a considerable range in the values of aerobic, mesophilic microbial counts associated with different size soil fractions; (2) as soil particle size increases, there is an increase in the mean microbial concentration per particle; (3) plate counts of aerobic, mesophilic organisms in unheated soils yielded a mean concentration of about six organisms per particle for the smallest soil fraction; (4) aerobic, mesophilic counts for sonicated particles heated at 80 C for 20 minutes yielded mean values of about two organisms per particle for the smallest particles; (5) some actinomycetes associated with the soil fractions could survive dry heat treatment at 110 C for one hour; and (6) soil particles stored under ambient laboratory conditions for 2.5 years aerobic, mesophilic plate counts which were comparable or slightly greater than the counts for more recently collected soil. Author

N74-33576# Texas Univ., Houston. M. D. Anderson Hospital and Tumor Inst.
RADIATION AND BIOPHYSICAL STUDIES ON CELLS AND VIRUSES Progress Report, 16 Oct. 1972 - 28 Feb. 1974
A. Cole 1974 51 p refs
(Contract AT(40-1)-2832)
(ORO-2832-126) Avail: NTIS HC $5.75

Progress is reported in studies on the effects of ionizing radiation on mammalian cells and on viruses. Topics discussed in detail include: the organization of the genetic structure of chromosomes and nucleoproteins; the effects of gamma and electron irradiation on cellular constituents with emphasis on DNA strand breaks and repair mechanisms; and the semiconductor properties of biomolecules and applications to melanin-containing cells. A list is included of 27 publications during the time period covered by this report that describe the findings in detail. NSA

N74-33577# Wyoming Univ., Laramie.
PHOTO-INITIATED PROCESSES IN VISION Technical Progress Report, 1 Jul. 1973 - 30 Jun. 1974
A. V. Guzzo 1974 6 p
(Contract AT(11-1)-1627)
(COO-1627-28) Avail: NTIS HC $4.00

Results are reported from studies on the initial photochemical processes associated with visual excitation in animals. NSA

N74-33578# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
THE DESIGN OF A MOCK CIRCULATION SYSTEM M.S. Thesis
W. H. Lelivеld Jun. 1974 23 p refs
(TH-74-E-47; ISBN-90-6144-047-5) Avail: NTIS HC $4.25

A mock circulation system, consisting of an artificial left ventricle, an aorta and a termination, is presented. This model, which can serve several purposes, such as testing artificial heart valves, was specially built for the purpose of testing parameter estimation techniques on the human aorta under realistic conditions. The circulation system also offers the possibility to evaluate the measuring methods, as well as the possibility to verify the results obtained by estimating parameters of the aorta such as the elasticity of the aortic wall. Author (ESRO)

N74-33579# Naval Weapons Lab., Dahlgren, Va.
BIOMEDICAL ASPECTS OF NONIONIZING RADIATION
William C. Milroy Mar. 1974 97 p refs Presented at Proc. of Symp. on Biomed. Aspects of Nonionizing Radiation, Dahlgren, Va., 10 Jul. 1973
(AD-780222; NWL-TR-3110) Avail: NTIS CSCL 06/18

The report consists of the proceedings of a one-day Symposium on Biomedical Aspects of Nonionizing Radiation held on 10 July 1973 at the Naval Weapons Laboratory, Dahlgren, Virginia in conjunction with the opening and dedication of the new Biomedical Research Laboratory. It includes a compilation of six invited papers presented at the Symposium by leading authorities in the fields of bio-engineering, comparative biology, human exposure factors, high power pulses, and EMP bio-effects. Author (GRA)

N74-33580# Rockefeller Univ., New York. Center for Visual Science.
SPATIAL SENSITIZATION BY SINUSOIDALLY MODULATED BACKGROUNDS Ph.D. Thesis
Michael A. Nelson May 1974 63 p refs
(Contract N00014-67-A-0398-0007)
(AD-781334; TR-74-1) Avail: NTIS CSCL 05/10

The response of the visual system to increment flashes presented on sinusoidally flickering backgrounds is not linear in relation to the stimulus conditions employed in these experiments. The mechanisms which determine increment thresholds on flickering backgrounds have many characteristics which are similar to the receptive field organization of retinal ganglion cells. A model of sensitization based on the disturbing influence on increment thresholds of nearby contours does not appear to be consistent with these data, whereas center-surround models appear to account for the data well. GRA

N74-33581# Maryland Univ., College Park. Dept. of Psychology.
SOME RELATIONSHIPS AMONG AND BETWEEN MEASURES OF EMPLOYEE PERCEPTIONS AND OTHER INDICES OF ORGANIZATION EFFECTIVENESS
Benjamin Sneider and Robert A. Snyder May 1974 45 p refs
(Contract N00014-67-A-0239-0025; NR Proj. 151-350)
(AD-781888; RR-5) Avail: NTIS CSCL 05/10

Relationships with respect to two measures of job satisfaction and one of organizational climate, among seven production and turnover indices of organizational effectiveness, and between the two sets of measures were investigated in 50 life insurance agencies. Climate and satisfaction measures are correlated. People appear to agree more on the climate of their agency than they do on their satisfaction. Agency effectiveness is related to gross agency size, satisfaction and retention. Implications of these data for research on climate and satisfaction as well as organizational change are discussed. (Modified author abstract) GRA

N74-33582# Hawaii Univ., Honolulu. PEACESAT Project.
PACIFIC SATELLITE HEALTH INFORMATION STUDY Final Report, May 1972 - Aug. 1973
John Bystrom May 1974 151 p refs
(Contract HS-72-4706)
(PB-232367/3; LHNCBC-74-05) Avail: NTIS HC $4.75 CSCL 06E

The Pacific satellite health information project was developed to assist development of effective medical and health information transfer. The following results are reported: (1) A study environment was developed in the Pacific, and committees were formed for health information and evaluation; (2) Studies were completed on medical communication requirements, health care status and status of libraries in the U.S. and related areas of the Pacific; (3) Demonstration satellite ground terminals were constructed; (4) Biomedical data transmission tests were undertaken using the voice grade satellite circuit; (5) and pilot demonstrations of satellite communications were made. GRA

N74-33583# National Inst. for Occupational Safety and Health, Rockville, Md.
OCCUPATIONAL NOISE AND HEARING 1968 - 1972 Final Report
Barry L. Lempert and T. L. Henderson 1973 54 p
(PB-232284/0; NIOSH-TR-201-74) Avail: NTIS HC $5.75 CSCL 06J

The aim of the occupational noise and hearing survey was to characterize noise exposure levels in a variety of industries, to describe the hearing status of workers exposed to such noise conditions, and to establish a relationship between occupational noise exposure and hearing loss that would be applicable to general industry. The four primary types of data collected during the study were noise measurements, personal background information, medical and otologic data, and audiometric data. GRA

N74-33584*# Naval Aerospace Medical Research Lab., Pensacola, Fla.
PERCEPTION OF BODY POSITION AND SUSCEPTIBILITY OF MOTION SICKNESS AS FUNCTIONS OF ANGLE OF TILT AND ANGULAR VELOCITY IN OFF-VERTICAL ROTATION
Earl F. Mill and Ashton Graybiel 4 Jun. 1973 13 p refs
(NASA Order T-81633; NASA Order T-59048)
(NASA-CR-140035; AD-772702/7; NAMRL-1182) Avail: NTIS HC $3.00 CSCL 06/19

Four normal subjects manifested little or no susceptibility to motion sickness in a chair device tilted 10 degrees off-vertical and rotated at 2.5 rpm; with further rate increases the end-point to mild symptoms was always reached and within increasingly short durations. Susceptibility was maximal at either 15 rpm or 20 rpm, but with higher rotational rates, declined rapidly, reaching a plateau of relatively low susceptibility at 40 rpm and 45 rpm; at these higher velocities, the subjects began to lose their sensation of being tilted off-vertical. Two subjects were asymptomatic when the chair was tilted 2.5 degrees off-vertical and rotated at 17.5 rpm; with greater angles of tilt susceptibility of all subjects increased in ever-decreasing amounts. Author (GRA)

N74-33585*# Pillsbury Mills, Inc., Minneapolis, Minn.
SPACE SHUTTLE/FOOD SYSTEM STUDY. VOLUME 2, APPENDIX E: ALTERNATE FLIGHT SYSTEMS ANALYSIS [1974] 94 p
(Contract NAS9-13138)
(NASA-CR-134377) Avail: NTIS HC $7.75 CSCL 06H

The functional requirements of stowage, preparation, serving, consumption, and cleanup were applied to each of the five food mixes selected for study in terms of the overall design of the space shuttle food system. The analysis led to a definition of performance requirements for each food mix, along with a definition of equipment to meet those requirements. Weight and

volume data for all five systems, in terms of food and packaging, support equipment, and galley installation penalties, are presented. Author

N74-33586# Civil Aeromedical Inst., Oklahoma City, Okla.
SONIC BOOM STARTLE EFFECTS: REPORT OF A FIELD STUDY
Richard I. Thackray, Ragnar Rylander (Natl. Swedish Environ. Protection Board), and R. Mark Touchstone Jul. 1973 19 p refs
(AD-773451; FAA-AM-73-11) Avail: NTIS HC $3.00

Results of a sonic boom field study conducted in Sweden during October 1972 are reported. Ten female subjects were tested indoors on each of six days. Fighter aircraft flying at various heights over the test site produced booms with outdoor overpressures ranging from 60-640 N/sq m. The number of booms extended from 5 to 13 per day. Subjects performed indoors on an arm-hand steadiness task. The results indicated that outdoor overpressures ranging from 70-120 N/sq m. (26-35 N/sq m. indoors) produced reflexive arm-hand movements in about 10 per cent of the subjects. Booms of 300 N/sq m. (67 N/sq m. indoors) and greater produced responses in about 75 per cent of the subjects. Between these extremes of overpressure there was the suggestion of a critical overpressure range lying between 150-180 N/sq m. (40-46 N/sq m. indoors) in which an abrupt increase in startle response occurred. Author

N74-33587# Civil Aeromedical Inst., Oklahoma City, Okla.
THE RELATIONSHIP OF AGE AND ATC EXPERIENCE TO JOB PERFORMANCE RATINGS OF TERMINAL AREA TRAFFIC CONTROLLERS
Bart B. Cobb, Peter L. Nelson, and John J. Mathews Apr. 1973 52 p refs
(AD-773449; FAA-AM-73-7) Avail: NTIS HC $3.75

Experimental ratings of job performance and other data are reported for several hundred journeymen radar control specialists of 17 high IFR traffic density terminal area traffic control facilities. Significant inverse relationships were found between job ratings and both chronological age and tenure in FAA ATC work. Results of a comparative analysis of data for dichotomized groups aged 40 and younger and 41 and older within each of several length-of-experience groupings indicated that: (1) the younger subjects of every experience level tended to receive higher evaluations than those over 40 years old; and (2) the greater mean differences in performances ratings pertained to the dichotomized age groups having over 10 years experience. Other results also suggested that ATCS proficiency is more apt to decline as a result of factors associated with aging than as a consequence of presumed effects stemming from lengthy ATC experience. Author

N74-33588*# AiResearch Mfg. Co., Los Angeles, Calif.
MEMBRANE EVAPORATOR/SUBLIMATOR INVESTIGATION
J. Elam, J. Ruder, and H. Strumpf 2 Apr. 1974 44 p refs (Contract NAS9-10465)
(NASA-CR-140261; AiResearch-74-10256) Avail: NTIS HC $5.25 CSCL 06K

Data are presented on a new evaporator/sublimator concept using a hollow fiber membrane unit with a high permeability to liquid water. The aim of the program was to obtain a more reliable, lightweight and simpler Extra Vehicular Life Support System (EVLSS) cooling concept than is currently being used. Author

N74-33589*# AiResearch Mfg. Co., Los Angeles, Calif.
MEMBRANE WATER DEAERATOR INVESTIGATION
J. Elam, J. Ruder, and H. Strumpf 26 Feb. 1974 34 p refs (Contract NAS9-10465)
(NASA-CR-140259; AiResearch-74-10072) Avail: NTIS HC $4.75 CSCL 06K

The purpose of the membrane water deaerator program was to develop data on a breadboard hollow fiber membrane unit that removes both dissolved and evolved gas from a water transfer system in order to: (1) assure a hard fill of the EVLSS expendable water tank; (2) prevent flow blockage by gas bubbles in circulating systems; and (3) prevent pump cavitation. Author

N74-33590*# AiResearch Mfg. Co., Los Angeles, Calif.
MEMBRANE HUMIDITY CONTROL INVESTIGATION
J. Elam, J. Ruder, and H. Strumpf 15 Apr. 1974 30 p refs (Contract NAS9-10465)
(NASA-CR-140260; AiResearch-74-10255) Avail: NTIS HC $4.50 CSCL 06K

The basic performance data on a hollow fiber membrane unit that removes water from a breathing gas loop by diffusion is presented. Using available permeability data for cellulose acetate, a preliminary design was made of a dehumidifier unit that would meet the problem statement. M.C.F.

N74-33591*# Columbia Univ., New York. School of Public Health.
EVALUATION OF THE EFFECTS OF ONE YEAR'S OPERATION OF THE DYNAMIC PREFERENTIAL RUNWAY SYSTEM
Paul N. Borsky Oct. 1974 23 p refs
(Grant NGL-33-008-118)
(NASA-CR-140488) Avail: NTIS HC $4.25 CSCL 05E

The FAA introduced an experimental aircraft operations program at JFK Airport called the Dynamic Preferential Runway System (DPRS) in the summer of 1971. The program is designed to distribute air traffic as equally as possible over the surrounding communities, to limit periods of continuous overflight and to vary the same hours of overflight from day to day. After a full year's operation, an evaluation was made of the system's effectiveness. All of the operation's goals were moderately achieved with the greatest relief in reduced overflight afforded the most heavily impacted areas. Few residents, however, were aware of DPRS or felt that it had greatly reduced annoyance or represented a major effort by the aircraft authorities. Statistical analyses of reported annoyance obtained from two independent surveys in 1969 and 1972 reveal limited reductions in annoyance in 1972, with shifts from reported high annoyance to moderate annoyance. Author

N74-33592*# Techtran Corp., Glen Burnie, Md.
THE PNEUMOOXYHEMOGRAPH-3, AN INSTRUMENT FOR THE INVESTIGATION OF THE FUNCTIONAL STATE OF BLOOD CIRCULATION AND RESPIRATION
A. M. Sviridov Washington NASA Oct. 1974 9 p Transl. into ENGLISH from Med. Tekhn. (Moscow), no. 4, Jul. - Aug. 1973 p 50-53
(Contract NASw-2485)
(NASA-TT-F-15867) Avail: NTIS HC $4.00 CSCL 06B

An instrument is reported that can simultaneously or continuously record on paper tape a pneumogram, oxyhemogram and electrocardiogram with an indication of time. Simple changes in speed make it possible to record the frequency and rhythm of heart contractions. Such information is vital in treating cardiopulmonary conditions. Author

N74-33593*# Kanner (Leo) Associates, Redwood City, Calif.
DETECTION OF ACOUSTIC SIGNALS OF DIFFERENT DURATION UNDER THE ACTION OF CERTAIN DRUGS
A. V. Baru Washington NASA Oct. 1974 21 p refs Transl. into ENGLISH from Zh. Vyssh. Nerv. Deyateln. im. I. P. Pavlova (USSR), v. 17, no. 1, 1967 p 107-115
(Contract NASw-2481)
(NASA-TT-F-15977) Avail: NTIS HC $4.25 CSCL 05E

An experimental verification was made of the hypothesis that there are two spatially distinct mechanisms of the analysis of short and long acoustic signals and that the former is associated with the activity of the temporal levels of the cortex of the cerebral hemispheres. Two drugs with different mechanisms of action were administered to eight healthy adults and, over different periods of time, to intact and operative dogs. Measurements were made of the detection thresholds for ringing of a 1000 Hz tone and white noise with duration of 2, 4, 12, 16, 36, 80, 100, 210, 300, 400, 500, and 1000 msec. It was found that caffeine causes decreases in the detection threshold for short

signals, while amphetamine causes these changes for longer signals (t somewhat greater than 10 msec). Author

N74-33594# Commissariat a l'Energie Atomique, Grenoble (France).
ELECTRODES IN ELECTROPHYSIOLOGY
J. Max 23 May 1973 28 p refs In FRENCH Presented at the Course given at the Faculty of Med. Meeting, Clermont-Ferrand, France, 27 Apr. 1973
(CEA-Conf-2511; Conf-730478-1) Avail: AEC Depository Libraries HC $4.50

After reporting on the utilization of electrodes in electrophysiology as well as on the imperatives to which these electrodes respond, a brief report was made on the theory of electrodes. A review was also made of the different characteristics of these electrodes. The principle types of electrodes along with principle setups for them are reported. Transl. by E.H.W.

N74-33595# Air Force Human Resources Lab., Brooks AFB, Tex.
RELATIONSHIPS AMONG AN INDIVIDUAL INTELLIGENCE TEST AND TWO AIR FORCE SCREENING AND SELECTION TESTS Final Report, Feb. 1972 - Jul. 1973
David F. McGrevy, Stephen B. Knouse, and Ronnie A. Thompson Mar. 1974 17 p refs
(AF Proj. 7719)
(AD-781033; AFHRL-TR-74-25) Avail: NTIS CSCL 05/10

With the implementation of the all volunteer force concept, the Air Force must insure that the objectively measurable range of ability in its manpower pool is being utilized. This is especially true for minority groups who have been categorized and channeled into military career areas based upon their performance on two selection tests: the Armed Forces Qualification Test (AFQT) and the Airman Qualifying Examination (AQE). To investigate the relationship of the AFQT and AQE to the general mental ability of different racial groups of airmen, a sample of 100 black and 100 white Air Force basic trainees was administered an established test of general mental ability, the Wechsler Adult Intelligence Scale (WAIS). The verbal, performance, and full scale IQ scores of the white and black airmen were compared to their AFQT scores and their four AQE aptitude indexes. Significant differences between black and white airmen were found on the AFQT, the four AQE aptitude indexes, and the three WAIS IQs. Regression analyses demonstrated most differences to be interaction effects between race and Air Force test scores. Implications for further research into Air Force airmen selection tests were discussed. Author (GRA)

N74-33596# Civil Aeromedical Inst., Oklahoma City, Okla.
CHARACTERISTICS OF MEDICALLY DISQUALIFIED AIRMAN APPLICANTS DURING CALENDAR YEAR 1971
Charles F. Booze, Jr. May 1974 18 p refs
(AD-781684; FAA-AM-74-5) Avail: NTIS CSCL 05/9

The study quantifies some medical and general descriptive characteristics of airmen medically disqualified during calendar year 1971. Such information has been of continual interest to the Office of Aviation Medicine and the aviation community for purposes ranging from program monitoring to disability risk determination. Specifically, the study presents descriptive data concerning age, sex, occupation, class of medical certificate applied for, cause-specific denial rates, and total flying time for medically disqualified applicants. Separate attention is devoted to airline pilots as a result of numerous inquiries. GRA

N74-33597# Applied Science Associates, Inc., Valencia, Pa.
IMPROVING JOB PERFORMANCE AIDS THROUGH CONDENSATION, DUAL-LEVEL PRESENTATION, PROMOTION OF LEARNING, AND ENTRY BY MALFUNCTION SYMPTOMS Final Report, 15 Aug. - 15 Dec. 1973
Reid P. Joyce Mar. 1974 82 p refs
(Contract F33615-73-C-4033; AF Proj. 1710)
(AD-781757; AFHRL-TR-74-12) Avail: NTIS CSCL 05/9

The report describes the research effort that attempted to simplify and condense the presentation of Job Performance Aid (JPA) data. It also describes a method of presenting technical data to both experienced and inexperienced personnel in one JPA format. Such factors as text limitations, illustration criteria, layout restrictions, and physical size of the manuals were found to contribute to the excessive bulk of the JPAs. Controls were developed for each of the influencing factors. Dual-level presentation of technical data was also studied. This portion of the study identified the types of information required, and not required, by experienced technicians. (Modified author abstract) GRA

N74-33598# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
THE APPLICATION OF THERMAL SEALING TO AIRCREWMAN'S INFLATABLE PROTECTIVE EQUIPMENT
Robert Z. Snyder 14 Mar. 1974 16 p refs
(F5123401)
(AD-782355; NADC-74034-40) Avail: NTIS CSCL 06/17

A program was undertaken to develop material research and thermal sealing methods to improve the overall characteristics of aircrew inflatable protective equipment, making use of impermeable coated fabrics. Anti-exposure suits, anti-exposure mittens and hood, anti-G coveralls, life preservers and life rafts, are now assembled using neoprene-coated nylon and a cold cementing procedure; this method of construction, however, requires many hours of labor and results in excessive stiffness and bulk in the finished item. Polyurethane-coated nylon fabric of various weights, construction, and coatings were investigated, as well as dielectric and ultrasonic thermal sealing techniques, equipment, and final assembly criteria with the ultimate goals being: weight reduction without sacrifice of seam strength, increased comfort in personally worn items, production cost reduction, and improved reliability. (Modified author abstract) GRA

N74-33599# Essex Corp., Alexandria, Va.
EVALUATION OF THE ANTHROPOMETRIC COMPLIANCE TOOL Final Report, Jun. - Dec. 1973
May 1974 101 p
(Contract DOT-HS-120-3-773)
(PB-232540/5; DOT-HS-801-124) Avail: NTIS HC $4.50 CSCL 14B

The objectives of the investigation were to: (1) establish the utility of the anthropometric compliance tool as a field test instrument; (2) determine the reliability of tool measurements; and (3) formulate recommendations for tool redesign or tool procedure modification. The tool evaluation was conducted by means of an empirical investigation of its accuracy, reliability, and usability in five types of vehicles. Subjects were selected for this investigation to be representative of the general population of compliance test personnel. The tool was evaluated in terms of its capability to measure to two foot controls and three hand controls. Measures of performance included time to assemble, install, and use the tool, procedural errors, and tool accuracy and reliability in measuring distances to controls with respect to the seating reference point. GRA

N74-33600# Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF ANALYTIC TECHNIQUES TO MEASURE HUMAN EXPOSURE TO FUEL ADDITIVES Final Report
Donald E. Johnson, John B. Tillery, John M. Hosenfeld, and James W. Register Mar. 1974 163 p refs
(Contract EPA-68-02-0595)
(PB-232124/8; SwRI-01-3451-001; EPA-650/1-74-003) Avail: NTIS HC $5.00 CSCL 06F

This study was to investigate analytical and sampling methodology for measuring amount of exposure and health effects of fuel additives to urban and rural populations. Both human exposure to normal levels of fuel additives present in urban traffic and to the high concentration under occupational conditions such as attendants in garages and parking lots and to policemen working in heavily trafficked areas. Fuel additives studied included the heavy metals, lead, manganese, copper, and zinc. Also measured in human tissue samples was the fuel impurity, cadmium. Trace metals in hair were determined to reflect long-term exposure. Blood and urine samples reflected short-term exposure. Feces measurement for lead and cadmium provided an estimation of dietary contributions. GRA

N74-33601# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EFFECTS OF THE PHYSIOLOGICAL ENVIRONMENT ON THE LONG-TERM PHYSICAL PERFORMANCE OF POLYMERIC MATERIALS Annual Report, Oct. 1972 - Nov. 1973
J. Moacanin, R. F. Fedors, J. D. Ingham, and E. F. Cuddihy 14 Mar. 1974 105 p refs Sponsored by NIH
(PB-232841/1; JPL-1200-160) Avail: NTIS HC $4.50 CSCL 06L

Extensive studies were made on the time-dependent physical properties of segmented polyetherurethanes, a class of elastomers being evaluated for implantable devices. It was shown that uniaxial tensile properties can be factorized, as previously demonstrated for conventional vulcanizates. Hence, a basis for the assessment of long-term fatigue, was established. Moreover, it was shown that sorbed water modifies properties markedly. The swelling behavior in water of both the urethane elastomer and of poly-HEMA grafted to the same elastomer was studied. Swelling of the poly-HEMA phase was nearly independent of crosslink density. A unique dip-molding process was developed for the fabrication of bladders from the urethane elastomer. GRA

N74-33602# National Inst. for Occupational Safety and Health, Rockville, Md.
AN OCCUPATIONAL HEALTH SURVEY OF SELECTED AIRPORTS Final Report
Lee B. Larsen 1974 78 p refs
(PB-232248/5; NIOSH-TR-204-74) Avail: NTIS HC $4.00 CSCL 06J

The objective of the survey was to describe the potential occupational health hazards present in airport operations. No attempt was made to evaluate safety hazards. This survey was conducted primarily to define potential industrial hygiene hazards, and to determine what medical and industrial hygiene services are provided those associated with the airline industry. Industrial hygiene surveys were conducted in the following work areas: office, warehouse and air freight, cafeteria and kitchen, ramps, airport maintenance, baggage handling, airline reservations and aircraft maintenance. Some recommended control guidelines and work practices were given. GRA

N74-33603# Army Foreign Science and Technology Center, Charlottesville, Va.
MINERAL COMPOSITION OF FOOD RATIONS FOR TESTERS OF THE BIOLOGICAL LIFE SUPPORT SYSTEM
M. I. Veber and Yu. N. Okladnikov 17 Mar. 1974 8 p refs Transl. into ENGLISH from Vop. Pitan. (USSR), no. 2, Mar. - Apr. 1973 p 24-26
(AD-781967; FSTC-HT-23-1853-73) Avail: NTIS CSCL 06/8

Mineral composition of a diurnal food ration made up predominantly of lyophilized products and of the same ration after replacement of its vegetable constituents by a nutritional biological mass of higher plants grown in a phytotrone of the biological human life support system was investigated. The final results prove that as concerns the phosphorus, magnesium, sulphur, potassium, sodium, and calcium levels the compositions of the ration under study do not differ essentially one from the other and meet the recommended physiological standards. GRA

N74-34417 National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
ELECTROMAGNETIC FIELDS AND WOUND REPAIR c04
C. Romero-Sierra (Queen's Univ., Kingston, Ontario), S. Halter (Queen's Univ., Kingston, Ontario), and J. A. Tanner *In its* Quart. Bull. of the Div. of Mech. Eng. and the Natl. Aeron. Estab. 30 Jun. 1974 p 25-34 refs

Experiments were conducted to compare the effect on wound healing of treatment with saline, or histamine diphosphate alone, or combined with the application of electromagnetic (EM) fields. Surgical incisions in the skin of the dorsum of 240 rats were treated with either saline or histamine. One-half of the animals treated with each chemical were exposed to a VHF (27 MHz) EM field for 15 minutes. Histamine treatment in conjunction with EM field exposure proved most efficient in improving wound healing (rate of healing, efficiency, minimized scar tissue). Saline treatment plus EM field exposure, histamine alone, and saline alone were successively less effective. The medical efficacy of EM field treatment is demonstrated, and it is noted that the greatest effect occurs within 12 hours of treatment. Author

N74-34558*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MICROBIOLOGICAL ASPECTS OF CLEAN ROOM TECHNOLOGY AS APPLIED TO SURGERY, WITH SPECIAL REFERENCE TO UNIDIRECTIONAL AIRFLOW SYSTEMS
Michael D. Wardle 9 Jul. 1974 88 p refs
(Contract NAS7-100)
(NASA-CR-140176; JPL-SP-43-7) Avail: NTIS HC $7.50 CSCL 06E

The microbiological aspects of clean room technology as applied to surgery were reviewed. The following pertinent subject areas were examined: (1) clean room technology per se and its utilization for surgery, (2) microbiological monitoring of the clean room surgical environment, (3) clean rooms and their impact on operating room environmental microbiology, and (4) the effect of the technology on surgical wound infection rates. Conclusions were drawn for each topic investigated. Author

N74-34559*# Minnesota Univ., Minneapolis. Space Science Center.
PROJECT ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE Summary Progress Report, 1 Jun. - 30 Nov. 1973
Irving J. Pflug 30 Nov. 1973 28 p
(Grant NGL-24-005-160)
(NASA-CR-140522) Avail: NTIS HC $4.50 CSCL 06M

The viability and dry heat resistance of indigenous microflora associated with small soil particles were investigated. An aluminum boat TDT CUP-TSA solid media system was developed for the analyses; a complete description of the technique is included. Data cited here were obtained using analyses of individual soil particles. Detailed particle viability profiles for dry heat effects were determined for Kennedy Space Center soil. At 110 C at least some particles retained viability through a heating period of between 8 and 16 hours. Single particles heated at 125 C for 80 minutes or longer did not show evidence of viability under test conditions. Preliminary aerobic, mesophilic plate counts of the 74-88 micron m soil fraction yielded mean values of 16.2 organisms per dark particle and 2.6 organisms per light particle. Heat treatment of particles in a dry atmosphere did not appear to increase the rate of inactivation for in situ soil particle microflora. Author

N74-34560# National Research Council of Canada, Ottawa (Ontario). Control Systems Lab.
A NEW APPROACH TO THE EXPERIMENTAL MODELLING OF SPINAL CORD INJURIES
W. Cook (Queens Univ.), A. Sierhuis, C. Romero-Sierra (Queens Univ.), and R. Hansebout (Montreal Neurol. Inst.) Dec. 1972 10 p refs
(LTR-CS-92) Avail: NTIS HC $4.00

Methods of creating spinal cord lesions were investigated. The two methods were compression by a belt around the cord and compression by inflating a saddle-shaped balloon. It was found that the belt has many basic disadvantages whereas compression by balloon is effective, efficient and adaptable to each animal individually. Author

N74-34561# Medical Coll. of Wisconsin, Milwaukee. Dept. of Environmental Medicine.
THE EFFECT OF CARBON MONOXIDE ON TIME PERCEPTION Final Report
Richard D. Stewart, Paul E. Newton, Michael J. Hosko, and Jack E. Peterson Jan. 1973 54 p refs
(Contract EPA-CPA-70-7)
(PB-232544/7; MCOW-ENVM-CO-72-2;
CRC-APRAC-CAPA-3-68; EPA-650/1-74-005) Avail: NTIS HC $3.75 CSCL 06T

Twenty-seven healthy, adult male and female volunteers were exposed to carbon monoxide at concentrations of smaller

than 2, 50, 100, 200 and 550 ppm for periods up to 4 1/2 hours for the purpose of determining the effect of gas upon time perception. These exposures, which resulted in a range of carboxyhemoglobin saturations up to 20%, produced no impairment in the ability of the subject to perform the Beard-Wertheim time discrimination test, to estimate ten or thirty second intervals, or to perform the Marquette time estimation test. GRA

N74-34562# Wayne State Univ., Detroit, Mich. Dept. of Neurosurgery.
BREAKING STRENGTH OF THE HUMAN SKULL VS IMPACT SURFACE CURVATURE Final Report, 20 Dec. 1971 - 31 Mar. 1973
R. Voigt and L. Murray Thomas Nov. 1973 189 p refs
(Contract DOT-HS-146-2-230)
(PB-233041/3; DOT-HS-801-002) Avail: NTIS HC$5.50 CSCL 06E

The effects of surface shape, hardness and impact location on the heads of human cadavers are observed. Impact surfaces included flat rigid and resilient, rigid cylindrical 1/8 in. radius up to 1 in. radius, resilient cylindrical 1 in. radius and rigid hemispherical shapes ranging from 3 in. to 8 in. radius. Impact locations include front, side and rear. The various impact conditions are related to type of skull fracture produced and several head injury parameters such as, velocity, peak force, acceleration, contact pressure and magnitude, and head injury criterion. GRA

N74-34563# School of Aerospace Medicine, Brooks AFB, Tex.
THE USAFSAM FACILITY FOR STUDIES UTILIZING LOW DOSE, LOW DOSE RATE IONIZING RADIATION Interim Report, 1 Apr. 1970 - 1 Jan. 1974
Jerry D. Siders, Jerome H. Krupp, and Kenneth A. Hardy Jun. 1974 10 p
(AF Proj. 7757)
(AD-782009; SAM-TR-74-16) Avail: NTIS CSCL 06/18

A facility was designed and built to provide continuous exposure to low-dose, low-dose-rate ionizing radiation. Four 60Co irradiators were fabricated by Technical Services Division, Oak Ridge Associated Universities (ORAU); a uniform exposure from 500 mrad to 2.5 R/day can be provided to an area of 512 cu ft (8 ft x 8 ft x 8 ft). Author (GRA)

N74-34564*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE NASA FIREFIGHTER'S BREATHING SYSTEM PROGRAM Status Report
Pat B. McLaughlan and Maurice A. Carson 10 May 1974 25 p Revised
(NASA-TM-X-70343) Avail: NTIS HC $4.25 CSCL 06K

The research is reported in the development of a firefighter's breathing system (FBS) to satisfy the operational requirements of fire departments while remaining within their cost constraints. System definition for the FBS is discussed, and the program status is reported. It is concluded that the most difficult problem in the FBS Program is the achievement of widespread fire department acceptance of the system. F.O.S.

N74-34565*# Pennsylvania State Univ., University Park. Transportation Inst.
REPORT ON OBJECTIVE RIDE QUALITY EVALUATION
J. C. Wambold and W. H. Park Mar. 1974 244 p refs
(Grant NGR-39-009-256)
(NASA-CR-132538; PTI-7412) Avail: NTIS HC $15.25 CSCL 05E

The correlation of absorbed power as an objective ride measure to the subjective evaluation for the bus data was investigated. For some individual bus rides the correlations were poor, but when a sufficient number of rides was used to give reasonable sample base, an excellent correlation was obtained. The following logarithmical function was derived: $S = 1.7245 \ln (39.6849 AP)$, where S = one subjective rating of the ride; and AP = the absorbed power in watts. A six-degree-of-freedom method developed for aircraft data was completed. Preliminary correlation of absorbed power with ISO standards further enhances the bus ride and absorbed power correlation numbers since the AP's obtained are of the same order of magnitude for both correlations. While it would then appear that one could just use ISO standards, there is no way to add the effect of three degrees of freedom. The absorbed power provides a method of adding the effects due to the three major directions plus the pitch and roll. Author

N74-34566*# AiResearch Mfg. Co., Torrance, Calif.
EVALUATION OF A LIQUID AMINE SYSTEM FOR SPACECRAFT CARBON DIOXIDE CONTROL Final Report
D. K. Breaux, P. Friedel, K. C. Hwang, G. Probert, J. M. Ruder, and L. Sawamura Sep. 1974 68 p refs
(Contract NAS1-11895)
(NASA-CR-137560; AiResearch-74-10178) Avail: NTIS HC $6.50 CSCL 06K

The analytical and experimental studies are described which were directed toward the acquisition of basic information on utilizing a liquid amine sorbent for in use in a CO2 removal system for manned spacecraft. Liquid amine systems are successfully used on submarines for control of CO_2 generated by the crew, but liquid amines were not previously considered for spacecraft applications due to lack of development of satisfactory rotary phase separators. Developments in this area now make consideration of liquid amines practical for spacecraft system CO2 removal. The following major tasks were performed to evaluate liquid amine systems for spacecraft: (1) characterization, through testing, of the basic physical and thermodynamic properties of the amine solution; (2) determination of the dynamic characteristics of a cocurrent flow absorber; and (3) evaluation, synthesis, and selection of a liquid amine system concept oriented toward low power requirements. A low weight, low power system concept was developed. Numerical and graphical data are accompanied by pertinent observations. Author

N74-34567*# Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.
THE EFFECT OF SIMULATOR DYNAMICS ON PILOT RESPONSE
Earl F. Weener 2 Oct. 1974 67 p refs
(Contract NSR-23-005-364)
(NASA-CR-132459) Avail: NTIS HC $6.50 CSCL 05E

The effects of visual display dynamics on the altitude tracking performance of a subject in a fixed base flight simulator are considered. The subject, flying the linearized longitudinal equations of motion, attempts to maintain the same altitude as two airplanes positioned three hundred feet ahead, as in level formation flying. The horizon together with the two leading aircraft are represented symbolically on a CRT display. The subject's aircraft is disturbed by atmospheric turbulence. The data indicate a relationship between the bandwidth of the display dynamics and the short period characteristics of the simulated airplane. For an airplane with a relatively fast pitch response the presence of altitude display dynamics, with a bandwidth as high as five times the short period natural frequency, causes significant degradation of altitude tracking performance. Author

N74-34568*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE EFFECTS OF BED REST ON CREW PERFORMANCE DURING SIMULATED SHUTTLE REENTRY. VOLUME 1: STUDY OVERVIEW AND PHYSIOLOGICAL RESULTS
Alan Chambers and Hubert C. Vykukal Washington Oct. 1974 33 p refs
(NASA-TN-D-7503; A-5241-Vol-1) Avail: NTIS HC$3.25 CSCL 06S

A centrifuge study was carried out to measure physiological stress and control task performance during simulated space shuttle orbiter reentry. Jet pilots were tested with, and without, anti-g-suit protection. The pilots were exposed to simulated space shuttle reentry acceleration profiles before, and after, ten days of complete bed rest, which produced physiological deconditioning similar to that resulting from prolonged exposure to orbital zero g. Pilot performance in selected control tasks was determined during simulated reentry, and before and after each simulation. Physiological stress during reentry was determined by monitoring

heart rate, blood pressure, and respiration rate. Study results indicate: (1) heart rate increased during the simulated reentry when no g protection was given, and remained at or below pre-bed rest values when g-suits were used; (2) pilots preferred the use of g-suits to muscular contraction for control of vision tunneling and grayout during reentry; (3) prolonged bed rest did not alter blood pressure or respiration rate during reentry, but the peak reentry acceleration level did; and (4) pilot performance was not affected by prolonged bed rest or simulated reentry.
Author

N74-34569*# Gulf South Research Inst., New Orleans, La.
WATER VAPOR DIFFUSION MEMBRANES Final Report
F. F. Holland, Jr. and J. K. Smith Sep. 1974 65 p refs
(Contract NAS2-7650)
(NASA-CR-137545) Avail: NTIS HC $6.25 CSCL 06K

The program is reported, which was designed to define the membrane technology of the vapor diffusion water recovery process and to test this technology using commercially available or experimental membranes. One membrane was selected, on the basis of the defined technology, and was subjected to a 30-day demonstration trial.
Author

N74-34570# Advisory Group for Aerospace Research and Development, Paris (France).
OPERATIONAL ASPECTS OF VARIATIONS IN ALERTNESS
Bryce O. Hartman (School of Aerospace Med.), William F. Storm (School of Aerospace Med.), John E. Vanderveen (School of Aerospace Med.), Ernestine Vanderveen (School of Aerospace Med.), Henry B. Hale (School of Aerospace Med.), and Ralph R. Bollinger (School of Aerospace Med.) Aug. 1974 42 p refs
(AGARD-AG-189; AGARDograph-189) Avail: NTIS HC $5.25

Variations in alertness undoubtedly affect operator performance, sometimes to a degree which significantly degrades operational effectiveness. Alertness is a biological state with behavioral, neurophysiological and biochemical elements. Related states are vigilance, attention, and arousal. This monograph summarizes the literature on these topics, as well as the influence of various environments on alertness levels, spontaneous fluctuations in alertness, and effects of such variation on operator performance. The environments under consideration include long duration flights, flights at night, monotonous tasks, solitude, mild hypoxia, and variations in thermal conditions in a flight compartment.
Author

N74-34571*# Systems Technology, Inc., Hawthorne, Calif.
THE EFFECTS OF BEDREST ON CREW PERFORMANCE DURING SIMULATED SHUTTLE REENTRY. VOLUME 2: CONTROL TASK PERFORMANCE Final Report
Henry R. Jex, Richard A. Peters, Richard J. DiMarco, and R. Wade Allen Washington NASA Oct. 1974 99 p refs
(Contract NAS2-6409)
(NASA-CR-2367) Avail: NTIS HC $4.00 CSCL 06S

A simplified space shuttle reentry simulation performed on the NASA Ames Research Center Centrifuge is described. Anticipating potentially deleterious effects of physiological deconditioning from orbital living (simulated here by 10 days of enforced bedrest) upon a shuttle pilot's ability to manually control his aircraft (should that be necessary in an emergency) a comprehensive battery of measurements was made roughly every 1/2 minute on eight military pilot subjects, over two 20-minute reentry Gz vs. time profiles, one peaking at 2 Gz and the other at 3 Gz. Alternate runs were made without and with g-suits to test the help or interference offered by such protective devices to manual control performance. A very demanding two-axis control task was employed, with a subcritical instability in the pitch axis to force a high attentional demand and a severe loss-of-control penalty. The results show that pilots experienced in high Gz flying can easily handle the shuttle manual control task during 2 Gz or 3 Gz reentry profiles, provided the degree of physiological deconditioning is no more than induced by these 10 days of enforced bedrest.
Author

N74-34572# National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
AN INSTRUMENT FOR TESTING ISOMETRIC STRENGTH AND ENDURANCE Final Report
D. F. Wasserman, T. Germann, D. V. Goulding, and F. Pizzo May 1974 33 p refs
(PB-233100/7; DHEW/NIOSH-74-109; NIOSH-TR-211-74) Avail: NTIS HC $4.75 CSCL 06B

A technical description is given of a versatile instrumentation system designed to obtain, monitor, and process human static strength and isometric endurance data. The system includes in-house designed mechanical and electronic apparatus as well as commercially available apparatus. Examples of the system's use with human subjects are presented.
GRA

N74-34573# Whittaker Corp., Waltham, Mass. Space Sciences Div.
FEASIBILITY STUDY ON A TELEVISION TECHNIQUE FOR MEASURING HUMAN EYE MOVEMENT Final Report
Jun. 1974 28 p refs
(Contract F33615-73-C-4122; AF Proj. 7222)
(AD-782037; AMRL-TR-74-74) Avail: NTIS CSCL 06/2

Counterroll measurements on the eyes of subjects undergoing various vestibular stimuli is of great interest and accumulation of data for analysis is an important part of such a study. It is very desirable to automate this measurement process of determining counterroll angle of the subject's eye at each instant of time. The objectives of this feasibility study are: To determine the possibility of automating the counterroll measurement from photographic slides; to determine the best possible measurement resolution that can be obtained under optimum conditions; and to consider various practical approaches to the instrumentation in order to effect a most satisfactory solution to this problem, including the feasibility of using video tape instead of photographic slides.
GRA

N74-35058 Joint Publications Research Service, Arlington, Va.
EFFECT AND AFTEREFFECT OF SPRING FROST ON WINTER WHEAT AS A FUNCTION OF NIGHT TEMPERATURES IN THE FALL AND SPRING **c04**
V. M. Mokiyevskiy *In its* Meteorol. and Hydrol., No. 7, 1974 (JPRS-63109) 2 Oct. 1974 p 92-98 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 7, 1974 p 74-78

The resistance of winter wheat to spring frost is basically determined by the temperature conditions of the spring period. The highest resistance to frost is formed in the case of cold nights in the fall and spring, and the least resistance, for warm nights in the fall and spring. The temperature conditions in the spring after the frost predetermine the formation of the final harvest. Low night temperatures promote the formation of a higher yield than high ones.
Author

N74-35064 Joint Publications Research Service, Arlington, Va.
SIGNIFICANCE OF THE DEGREE OF DEVELOPMENT OF WINTER WHEAT IN THE FALL FOR ITS WINTERING AND HARVEST IN THE NORTHERN CAUCASUS, IN THE ROSTOV OBLAST AND IN THE LOWER VOLGA REGION **c04**
I. V. Svisyuk *In its* Meteorol. and Hydrol., No. 7, 1974 (JPRS-63109) 2 Oct. 1974 p 127-131 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 7, 1974 p 94-96

The significance of the degree of development of winter wheat in the fall for its wintering and harvest in the Northern Caucasus, Rostov Oblast and Lower Povolzh'ye is demonstrated.
Author

N74-35065 Joint Publications Research Service, Arlington, Va.
EFFECT OF WEATHER CONDITIONS ON THE RICE HARVEST IN THE ASTRAKHAN OBLAST **c04**
V. I. But *In its* Meteorol., and Hydrol. No. 7, 1974 (JPRS-63109) 2 Oct. 1974 p 132-136 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 7, 1974 p 96-98

The statistical interrelations between the deviations of the actual mean oblast rice harvest from the sliding mean harvest and the magnitudes of the meteorological elements are analyzed. It is found that the weather conditions in September have a decisive effect on the magnitude of the given deviations. Author

N74-35162 Westinghouse Electric Corp., Pittsburgh, Pa.
HAZARDS **c05**
P. W. Davison *In* Princeton Univ. A Fusion Power Plant Aug. 1974 p 432-457 refs (For availability see N74-35146 24-25)

The major systems of the Princeton Reference Design Fusion Reactor are reviewed from the point of view of identifying the hazards associated with normal and abnormal operation. Engineered safeguards and operational procedures are identified for eliminating the hazards or minimizing their consequences. The most serious credible accident is identified as the design basis accident and the design requirements specified for assuring that the consequences of that accident will not exceed the regulatory limits for accident conditions. Data are provided to show the maximum allowable levels of radiation and radioactive materials for normal reactor operation. It is concluded that the fusion power plant can be operated without any significant hazards to the public or plant personnel during normal operation. For most modes of abnormal operation, hazards to the public are not significant if the recommended safety procedures are instituted. Author

Subject Index

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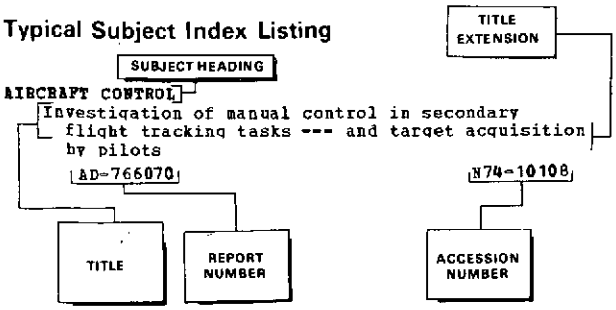

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Personal Author Index

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 136)* JANUARY 1975

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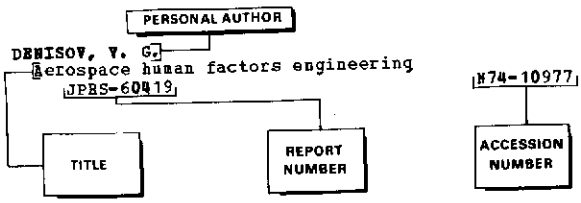

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